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STABILITY AND CHANGE IN THE MATERIAL CULTURE OF QUEEN CHARLOTTE SOUND IN THE 18TH CENTURY

D.R. SIMMONS

AUCKLAND INSTITUTE AND MUSEUM

Abstract. Items collected on the voyages of Captain Cook and by Captain Bellingshausen in 1820 are described to establish the Maori material culture of the Queen Charlotte Sound and the changes which occurred in that material culture. The description of a local material culture form for Queen Charlotte Sound has enabled a number of other items of less certain documentation to be identified as having been collected on Cook's voyages, or from the area. The material culture was found to be remarkably stable despite repeated incursions from outside the area.

The artefact collections made by Captain James Cook taken together with the observations and pictorial records of his voyages form an important documentation of Maori life, art and culture in the late eighteenth century.

In one sense prehistory was caught alive, in another, it ended. Yet neither of these statements is strictly true. Prehistory *was* caught alive on the First Voyage visits in October 1769, to Poverty Bay, Hawkes Bay, Coromandel and later, the Bay of Islands, but by the time Cook reached Queen Charlotte Sound in January 1770, the people there already knew about iron nails and were prepared to ask for them (Beaglehole 1955: 247). Culture contact on the First Voyage probably led to some movement of people to Queen Charlotte Sound but this could have been happening without the attraction of European ships.

First Voyage artefacts taken back to Europe are of very great importance but suffer from the lack of precise information on the locality from which they were collected. First Voyage collections will be discussed later, after the others.

The Second Voyage of Captain Cook to New Zealand included a stay in Dusky Sound and three successive visits to Queen Charlotte Sound between May 1773 and November 1774. While the collections from the Second Voyage are no better catalogued, the places from where they may have been collected are only two in number. Two of the major collections from the voyage are the Reinhold and George Forster Collection in the Pitt-Rivers Museum, Oxford, and the collection in the Anthropological Museum of the University of Göttingen in Göttingen. Additional pieces from the Forsters found their way into other collections. A smaller but nevertheless important collection is that made by the Forsters' fellow scientist Anders Sparrman which is in the Ethnographic Museum at Stockholm. Similarly for the Third Voyage when Cook called at Queen Charlotte Sound in February 1773, the artist Webber made a collection which is now in the Berne Historical Museum in Berne. These collections comprise the majority of the artefacts which can

be located to time and place during Cook's voyages. There are many other collections resulting from the Voyages but the documentation is often insufficient to be certain from which voyage they originated or to determine the place of collection.

It is the intention in this paper to study the well-located collections from the Queen Charlotte Sound area and to compare these to a later collection made in the same place in 1820 by the Russian navigator F.G. von Bellingshausen which is now housed in the Miklukho-Maklay Institute of Ethnography in Leningrad. By this means it is hoped to define the material culture of Queen Charlotte Sound in particular, but also, by matching the voyage journals and artefacts, to suggest the origin and culture of the groups who came to that area during and between the various voyages. From later examples, it is possible to identify the tribal styles of the artefacts. This procedure though, involves a presumption that the later style was also the style at an earlier period. Material culture evidence is examined particularly for stability rather than change, by concentrating on those items which are peculiar to Queen Charlotte Sound and which continue in use during the fifty years covered by the collections. From the writings of the Forsters in particular, certain items can be associated with local, or intrusive groups. For some of the latter there is information on their origins.

Having established items of material culture belonging to Queen Charlotte Sound or to other contiguous areas, then the proven items of a First Voyage provenance can be examined and their place of origin within New Zealand suggested. The collection of main concern is the Joseph Banks Collection in Stockholm, and some items in the British Museum or other museums, which were drawn for Joseph Banks after the First Voyage, or drawings for which there are no material items. Further items from the First Voyage are in the Trinity College Collection of the Cambridge Museum of Archaeology and Ethnology. These are the only collections whose history is traceable to the First Voyage with certainty.

During research leave in 1978 I was able to examine most of the artefacts included in these collections. The exceptions were those in the Stockholm Ethnographic Museum, where the collections were unavailable, but I had handled the Banks Collection when it was on loan from Stockholm to New Zealand in 1966.

THE SECOND VOYAGE

THE FORSTER COLLECTIONS OF ARTEFACTS FROM NEW ZEALAND

There are two main collections of material made by the Forsters which are still identifiable in European museums. The history of these was recorded by Adrienne Kaeppler of the Bishop Museum in 1978 (Kaeppler 1978: 43). A collection was given by Reinhold Forster to the Ashmolean Museum, Oxford and is now in the Pitt-Rivers Museum, University of Oxford in England, where it was transferred in 1886 (Gathercole n.d.). On his death some of Reinhold Forster's collection was sold to the forerunner of the Institute für Völkerkunde in the University of Göttingen in Germany while some items went to Berlin by direct purchase or by exchange from Göttingen . Others went to Würlitz University, Danzig, Mitau and extra pieces to Göttingen. The Forsters also gave some pieces to the British Museum in London but these cannot now be identified with certainty. There may also be pieces in Florence among the Cook collection there. The illustrations for the official account of the Third Voyage were from Forster artefacts.

The Forsters' opportunities for collecting Maori artefacts were limited to Dusky Sound and Queen Charlotte Sound, in the South Island, and a brief sail up the east coast of the North Island to Cape Turnagain.

DUSKY SOUND

One visit was paid to Dusky Sound between 28 March and 29 April 1773. Three or four families were met there, probably during their seasonal exploitation of the area. Two of these had double canoes, one of which "had a carved head coarsely representing a human face, with eyes made of round pieces of earshell" (Forster 1777, 1: 132). The other groups seen had log rafts (ibid: 170).

The first family seen on 28 March appears to have had little to trade. The second family had more goods. "They parted with several of their ornaments and weapons particularly battle axes . . . the man came to the waterside, and presented to Captain Cook a dress made of the flax plant, a belt of weeds, some beads made of little bird's bones, and some albatross skins" (Forster 1777, 1: 140).

Reinhold Forster was given "a new cloak or piece of cloth made of the flax plant curiously interwoven with parrot feathers" (Forster 1777, 1: 160-1). Hodges was also given a similar piece (Forster ibid: 162). The third family or group with a log raft seen on 20 April 1773 (Forster 1777, 1:169), presented a new garment to Cook.

These items which could have been collected in Dusky Sound, a cloak interwoven with parrot feathers, ornaments and weapons (particularly battleaxes), can be compared with the known materials in museums.

The cloak intertwined with parrot feathers would suggest a cloak with kaka feathers, possibly red. It may have been a complete covering or only had a few feathers attached in quillets in South Island style. These may now have fallen off as has been the case with a later cloak now in Leningrad. The Forster list which accompanied the artefacts to Oxford has been found and published by Peter Gathercole (n.d.). This includes an entry annotated by Gathercole, "No. 102 A feathered Coat, made of N.Z. flax and interwoven with parrots and ducks feathers: this from Dusky Bay". The specimen marked 102 does not tally with this. It is made of coarse flax, with a fringe along the lower edge. There are no feathers. It seems then the localization to Dusky Bay (Sound) cannot be accepted without more evidence.

Artefacts

Oxford 102 (Ashmolean No. 1134). Single pair twine cloak formerly decorated with feathers. Ling Roth described it in 1923 (Roth 1923: 87, fig.68) "It is a coarse piece of open-work at one time ornamented with feathers, the remains of the quills of which are seen in the knots on special sustaining bands laid between every 8 or 12 warps, and quite different to the feather attachment of other cloaks I have been able to examine. The principle seems to be the same as that in use on Hawaiian feather cloaks, where the feathers are held in the same way by sustaining bands, with this difference, that the Maori ground work is twined, while the Hawaiian is netted". The feathers would appear to have been attached at intervals to cords by half-hitching. These cords were then placed, as Ling Roth noted above, alongside every eight or twelve warps. The cloak was woven with

single pair twine 2.5 cm apart. On the right hand side three extra lines procede from the lower right hand corner. These do not converge on the other lines. There is no interpolation on the left side. The cloak is a cape, wider at the top than the bottom. The bottom is fringed with warp ends and extra tags. The top selvedge is formed by the warp ends looping over a passive cord then being held by the first row of twining. The weft lines at the side loop around a similar passive cord. The neck hem has a cord half-hitched at intervals along its length. Width at the top 127 cm, width at the bottom 195.5 cm, height at sides 109 and 112 cm.

Ornaments

Oxford 172. "Bunch of leaves which the New Zealanders use to stick in their ears". "Missing" (Gathercole n.d.). No Ashmolean Museum number.

No weapons can be identified in the collections.

QUEEN CHARLOTTE SOUND

People belonging to Queen Charlotte Sound and the immediate area could be expected to have a similar culture, a situation which would not have been greatly altered by the movement of people across Cook Strait. Fairly regular contact between the two islands is evidenced by the continuing prehistoric trade in nephrite from the South Island and obsidian from the North. It is likely that exploitation of the D'Urville — Nelson argillite belt for adze rock had continued in greater or lesser degree for some six hundred years. Influences and take-overs, especially from the south-west, south and south-east portions of the North Island would probably have been a way of life. In general though, the area was unattractive as a permanent home for agriculturally based groups in the 18th century. No agriculture was seen there during Cook's voyages.

During his Second Voyage, Cook made three visits to his base at Queen Charlotte Sound, an area previously visited on the First Voyage in 1769-70. It is obvious that trade with Europeans was a factor in the local way of life as Forster reports the experience of the "Adventure", sister ship to the "Endeavour" which preceded them to Queen Charlotte Sound, when they first arrived. "They had brought with them great quantities of their clothing, tools and weapons which they eagerly exchanged for nails, hatchets and cloth." (Forster 1777, 1: 199).

"The inhabitants of this Sound who amount to some hundred persons in several distinct and independant parties and were often at variance with each other, had begun an intercourse with them, and paid them several visits, coming from the interior parts" (Forster 1777, 1: 198).

The groups seen in Queen Charlotte Sound could have been of six main origins.

1. Local to the immediate area of Queen Charlotte Sound.
2. Local to the northern South Island, i.e. Admiralty Bay, Nelson, Golden Bay.
3. From other parts of the South Island.
4. From the Wanganui - Taranaki area of the west coast in the North Island.
5. From the Wellington - Horowhenua area of the south west coast in the North Island.
6. From Cape Terawhiti, Palliser Bay and the east coast of the North Island.

The groups who came to the ship, or were contacted, can be identified with reasonable surety as being from one of these origins. This identification is important, as artefact styles vary from one area to the next, and a particular item may correspond with the description of the piece said to be obtained in trade.

GROUPS LOCAL TO QUEEN CHARLOTTE SOUND

Two small canoes with five men (Forster 1777, 1: 204-206) exchanged: fish.

Several canoes, thirty people (Forster 1777, 1: 210) exchanged: tools, weapons, cloaks never interwoven with feathers but with dogskin at corners (ibid: 214), boghee — boghee or shaggy cloak, cap of brown feathers.

Natives from another part of the Bay (Forster 1777, 2: 468) exchanged: dresses, arms, other curiosities.

Peeterre's people of Shag Cove (Forster 1777, 2: 455) exchanged: greenstone chisels and ornaments, presented a taiaha to Cook.

Natives of East Bay (Forster 1777, 1: 505) exchanged: several large hoop nets, arms, utensils, dresses.

A small group (Forster 1777, 1: 505) exchanged: hoopnets.

Te Ringapuhi of Whekenui (Haghee-nooee), Tory Channel (Forster 1777, 1: 471-5) (who was fully tattooed as were most of his men) exchanged: arms, clothes.

Artefacts

Clothing

Oxford 105 (Ashmolean No. 1136). A plain *aronui* cloak with weft made with double pair twine 1 cm apart. The warp is decorated with three pairs of vertical light and dark lines spaced across the cloak. The two ends of the warp have a hem with no finishing lines added. The weft sides, now at top and bottom, have been finished with an extra rolled cord. Shaping is provided by three lines branching to become double on the right side and two lines branching on the left side. The cloak was originally woven from top to bottom in the normal way then turned so the weft is now vertical. The shaping is vertical. Width 152 cm, length 132 cm.

Stockholm 1799.2.2. Sparrman Collection (Soderstrom 1939: 50). A plain cloak of double-pair twine weft with some single pair as shaping at shoulders and hips. The two sides are finished with extra cords of brown flax. The upper and lower hems have been cut off. The lower corners on the cloak on the left and right side have been decorated with strips of dogskin in a right angle along the bottom and up the side. Width 151 cm, length 123 cm.

Oxford 107 (Ashmolean No. 1124). Shaggy cloak. This cloak is now missing but was described by Ling Roth (Roth 1923: 96-9, Fig. 79).

A coarse rain cloak. "The thatch is very grass like and does not split up like the phormium of the body of the garment, and is rough to the touch. It is put on in batches of four to eight fringes or tags at intervals, in alternate positions on the twined rows numbered 1,2,4,6,8,10,12,14,16,17,19,20,22 and 23, therefore practically on more than half" The upper hem is plaited. The warp is single pair twine spaced at 3.3 cm. The sides of the warps are tied off after looping around an extra line. The thatch tags are looped with one element on every second twine. Width top 99 cm, width bottom 104 cm, height 26 cm, fringe 20.5 cm.

Oxford 103 (Ashmolean No. 1132?). A double-pair twine plain *aronui* cloak with wefts about 1 cm apart. The bottom hem is decorated with a brown and natural braid about 2.5 cm wide. The top hem is finished with extra rolled brown cords. The top and bottom are the sides of the weaving originally. The weft has been finished by being cut off. At the left and right bottom corner of the cloak pendant strips of dogskin have been half-hitched on to the weaving after completion. Width 147 cm.

Oxford 104 (Ashmolean No. 1137). Cloak with dogskin at the corners. A plain cloak of single pair twine 5 mm apart which was probably worn as an *aronui* (vertical weft) as there are dogskin strips at each of the four corners, which would be horizontal if the cloak was worn as an *aronui*. The weft sides are now the top and bottom and have been finished with an extra rolled cord of light and dark brown. The warp has been cut off at either end with no special finish. Shaping is not present. At the top right, five strips of dogskin have been half-hitched with a continuous cord to the weaving after it was finished. At the top left, five strips of skin are attached, at the bottom right, five strips and at the bottom left, six strips. Width 186 cm, depth 142 cm.

Oxford 106 (Ashmolean No. 1133). *Taniko* cape made with single-pair twine 13 mm apart (canvas weave). The top selvedge is finished with a rolled cord sewn through the weaving to give a serrated effect. The sides are finished by the weft turning back. The "taniko" border is only at the base. It is 10 cm wide and plain black in colour except for a row of small black and brown triangles at top and bottom. The technique of the "taniko" is the same as the body of the cloak — single-pair twine. The "taniko" hem is finished with a natural colour plait. Shaping is hard to see in close weaving. In this cloak it consists of three interpolated lines at the centre bottom and three half way up which start and finish one third of the distance from the edges. A small strip of dogskin 3 cm long has been added to the upper right corner with half-hitching, another small piece at upper centre, and the stitches remain for another on the left. Pieces of dogskin have been attached to the lower border. Width top 119 cm, width bottom 128 cm, depth at centre 100 cm.

Oxford 127. Cap of brown feathers (not located). No Ashmolean Museum number.

Oxford 108 (Ashmolean No. 1182). A *tatua* or warrior's belt. A diagonally plaited belt folded over to form a pouch. At the ends there are two fibre plaits which merge to become the tie cord. The belt is plain and unpatterned. Length 84 cm, depth at centre 9 cm.

Weapons

Oxford 119 (Ashmolean No. 1150?). Greenstone *mere*. "A piece of green nephritick stone, shaped for a hatchet" (Gathercole n.d.). An adze-shaped *patu* with squared striking

edge and irregular butt with perforation. A fairly roughly made but nevertheless balanced and useable *mere* of flattish cross-section. Length 33 cm, width 10 cm, thickness 1 cm.

Oxford 115. "A pattou-pattou of green nephrite stone" (Gathercole n.d.) missing.

Göttingen OZ279 Patu paraoa. Whalebone *patu.* A long flat *patu* with a definite handle area. The butt ends in an "eyebrow" with slight dip in the centre. The perforation has a long round plaited cord passed through it. Length 48 cm, width 9.5 cm.

Würlitz 24 Patu paraoa. Whalebone *patu* with sinus holes from the jawbone from which it was made. A longish *patu* with fairly well marked handle area, rounded butt with five grooves cut across it. Length 39.7 cm, width 10.1 cm.

Stockholm 1799.2.5 (Sparrman Collection) *Patu onewa.* A basalt *patu* with pommel that does not expand and is decorated with three ridges. The pommel has a very squashed appearance. The perforation has a round plait in it. (Soderstrom 1939: 45). Length 29.5 cm, width 7.9 cm.

Oxford 112 (Ashmolean No. 1149). A basalt *patu* with slight expansion on the butt which is decorated with three ridges. The pommel is somewhat squashed up. Length 32.5 cm, width 9 cm, thickness 1.5 cm.

Göttingen OZ 278. A basalt *patu* with slightly flattened pommel with four ridges and rolled flax cord. Length 36 cm, width 18 cm.

? Berlin VI 58 (OZ440 ex Göttingen). A basalt *patu* with no expansion on the butt and three ridges of fairly squashed appearance. Length 31.6 cm, width 7.9 cm.

Wood clubs

Oxford 113 (Ashmolean No. 1151) *Wahaika.* A heavy unbalanced wood *wahaika* with carved blade with a figure on the side, hands on chest, legs down. There is no surface decoration on the figure. The figure has a wide mouth and sloping eyes. On the butt there is a sideways *manaia* head with a reversed teardrop shape for the head, the eyes being pierced; below is another teardrop point down, the two forming half of a figure-of-eight. The mouth is pierced. Surrounding both these shapes are quite heavy separated triangle notches *(pakati).* A square hole has been made in the handle. Style of carving Wanganui. Length 49 cm, width 16 cm.

Long clubs (Battle axes)

Göttingen OZ282 Taiaha. A long wooden two-handed club with face and protruding tongue at one end. The style is similar to Taranaki examples. The eyebrows and mouth are decorated with pakati notches but no small spirals. The tongue has two pairs of whorls made with two grooves *(haehae)* and one line of long diamond *pakati* notches. A diamond space is left between the first and second pair and after the second pair. Length overall 196 cm, length of head 22 cm, width of blade 10 cm.

Ornaments

Oxford 122 (Ashmolean No. 1319). "An earstone of greenstone" (Gathercole n.d.). An offcut of greenstone of rectangular cross-section bound with flax cord at the top. The cord forms the attachment. Length 16.5 cm, width 1.5 cm, thickness 1.3 cm.

Oxford 98. Necklaces.

Dentalium, shell, bone, brown shell. Length 76 cm.

Dentalium shell. Length 110 cm.

Dentalium shell and brown shell. Length 165 cm (Gathercole n.d.).

GROUPS LOCAL TO NORTHERN SOUTH ISLAND

Cultural items from this area could be indistinguishable from Queen Charlotte Sound or Wanganui - Taranaki artefacts. Traditionally, some inhabitants of the area orginated in the Wanganui - Taranaki area. Cultural influences from across Cook Strait appear to be strong at all periods even though the basic culture is very similar to that of Queen Charlotte Sound.

Items exchanged "by a large canoe with twelve people from the north" (Forster 1777, 1: 208) were the usual: dresses, stone hatchets, clubs, spears, paddles.

"Seven or eight canoes for the Northward exchanged a great variety of dresses, hatchets of stone, patoo patoos, battle-axes, clothes, green jade, fishhooks etc" (Forster 1777, 1: 508).

Artefacts in the collections which on style or function would seem proper to the northern South Island region are included here. They may belong here, to Queen Charlotte Sound or the Wanganui - Taranaki area.

Artefacts

Clubs

Oxford 114 (Ashmolean No. 1147?). *Patu paraoa*. A whalebone club of squat appearance with short heavy blade, marked handle area, perforation and slightly expanded butt with three ridges on it. Length 15.5 cm, width 13 cm, thickness 2 cm.

Capetown SAM 2031. (Kaeppler 1978: Fig. 361). (Sparrman). *Wahaika,* wood, unfinished.

Capetown SAM 2031. (Kaeppler 1978: Fig. 362). (Sparrman). *Wahaika,* wood, with very rounded blade projection, roughly blocked out with realistic figure on blade (unfinished).

Capetown SAM 2031. (Kaeppler 1978: Fig. 363). (Sparrman). *Wahaika,* wood, with figure on blade, rather flat and carved in a Cook Strait style, head on butt.

These three clubs could have been made anywhere in the Cook Strait area.

Long clubs

Oxford 111 (Ashmolean No. 1465). *Taiaha*. A "battle axe" or two handed club with head and protruding tongue at the lower end. The eyebrow and mouth area are decorated with notches *(pakati)* with interlocking crescents at the centre of each. The tongue decoration is two grooves and one notch line which form two pairs of back to back whorls. Length 191 cm, length of head 9 cm, width of blade 9 cm.

Stockholm 1799.2.6. *Pouwhenua*. (Soderstrom 1939: 48). A two handed club with spatulate end, a janus head and point on the handle end. The janus head is 44 cm from the point. Beneath this is a band of carved lines which roll into a spiral then out again. The eyebrows and lip of the janus head are decorated with notches with two interlocking crescents in the centre. A diamond-shape tooth decorated with square block notches is found in the mouth. The lower carving consists of grooves and flat surfaces. Across the grooves project Taranaki *ritorito* type designs, though not as regularly spaced as in Taranaki work in that the groups of three lines do not arise from a single source. Length 152 cm, blade width 11 cm.

Berlin VI 138. *Tewhatewha*. The janus head style is consistent with a Cook Strait provenance. This item could not be studied in detail.

Bailer

Oxford 117 (Ashmolean No. 1264). Bailer. A canoe bailer decorated with a mask with open mouth on the back portion and a manaia head on the handle. The carving is unfinished. The brows of the mask are wider than the mouth and the overall style is similar to Taranaki. Length 46 cm.

GROUPS FROM OTHER PARTS OF SOUTH ISLAND

Two small double canoes like Dusky ones (Forster 1777, 1: 204) included Kollakh (Korako) later of Otago (Forster 1777, 1: 209) exchanged on return (ibid: 500) a great number of green nephrite chisels, hatchets.

Artefacts

Greenstone adzes and chisels

Wörlitz 21. An adze blade in nephrite of rectangular cross-section, a rough working adze of a type of greenstone common in the Lake Wakatipu area. (Germer 1975: 91). Length 12.2 cm, width 6 cm.

Oxford 121. Greenstone chisel. Missing. No Ashmolean Museum number.

Stockholm 1799.2.23. Bone toggle, decorated with notches at one end and two sets of three chevron lines. A broken albatross bone flute. The design is of Otago type. (Soderstrom 1939: 57). Length 5 cm.

Musical instruments

Stockholm 1799.2.18. A wooden flute. *Koauau* open tube flute with three holes made from a light branch of *whau* or *tutu*. The holes have been burnt through and the body of the flute decorated with a line on the lip, five chevron lines above the first hole and four around the second hole. (Soderstrom 1939: 54). Length 12.1 cm.

GROUPS FROM NORTH ISLAND

WANGANUI - TARANAKI COAST OR HOROWHENUA

Several canoes of different sizes (Forster 1777, 1: 217), three with sails, some double or outrigger, i.e. a narrow plank fixed to one side by transverse poles. Distorted human figure at head and high sterns (ibid: 218). Their paddles were sharp, pointed (North Island style). Exchanged: blades of hatchets (?greenstone), long pieces for ears (*kuru* and *kapeu*), chisels in wood handles, contorted figures (e teghee), (*hei tiki).* Apron covered with red feathers, faced with white dogskin and ornamented with earshell, worn by women (ibid: 219), fishhooks, wood, barbed with bone. Human teeth on a thread.

The name of the chief who was ''Marked in the face with deeply excavated spiral lines'' was Tringho-Waya (? Taringawaea), (Forster ibid: 220).

Artefacts

Long pieces for ear

Wörlitz 25. Greenstone ear pendant in the shape of a chisel with perforated hole and twisted cord of flax (Germer 1975: 91). Length 9.2 cm, thickness 1.1 cm.

Oxford 123 (Ashmolean No. 1318). A kinky pendant, that is a pendant with a knee bend towards the top. Nephrite. A North Island style pendant. Length 15 cm, thickness 1 cm.

Chisels in wood handles

Stockholm 1799.2.4. A greenstone adze laid on to a plain haft with a flat heel lashed with sixteen turns of twisted flax cord. A cord goes from the base of the lashing, passes around the haft four times and is tied off (Soderstrom 1939: 49). Length of handle 40 cm, length of blade 14 cm.

Berlin VI21. A greenstone adze in a plain haft. The flat rectangular blade is recessed into the heel of the haft and is then lashed with a plaited cord with 17 turns. The end of the lashing loops around the handle. The back of the heel has a raised portion at the base to stop the lashing slipping off. This adze was on display and could not be measured. Length of blade *c.* 14 cm, haft *c.* 40 cm.

Berlin VI736 A & B. Hafted circular greenstone chisel. Hafted end on to a chisel handle. The handle has a recess for the chisel. The lashing wraps around the chisel and haft then continues up the haft. At the top end of the haft a small lashing is placed to stop splitting. The butt of the handle is not burred by use. This item was on display and could not be measured. Overall length *c.* 30 cm.

Ornaments

Oxford 120 (Ashmolean No. 1167). *Tiki* (contorted figures). Nephrite *hei tiki* which has the head with the chin on the left shoulder (of the figure), hands with fingers marked on the thighs and breasts marked. There is paua in the eyes. The *tiki* has a rounded appearance and with its body wider than head and other features, more closely resembles the later South Island types than Taranaki examples. Length 10 cm, width of head 5 cm, width of body 6.4 cm.

Oxford 126 (Ashmolean No. 1586). "A bundle of teeth worn on the breast". (Gathercole n.d.). Twenty-one human incisor teeth threaded onto a fine vine by a perforation in the base. These could be worn either as breast and/or ear ornaments. Overall diameter 6.5 cm.

The apron or *maro wahine* (woman's apron) has not been located in any of the Forster collections, neither can any fishhooks be attributed to the Forster collections with any certainty.

An item which belongs to Taranaki in carving style but which may have come from the northern South Island is the shark tooth knife in Oxford. The carving style is so clearly Taranaki that it would fit with the group mentioned here especially as they had human teeth ornaments. Such "Carving" knives appear to have been used for cutting up human flesh.

Oxford 110 (Ashmolean No. 1161). A *mira tuatini* or shark tooth knife, carved and painted and furnished with the teeth of the *tuatini* (seven gill shark) along the edge. The body of the knife has a large *manaia* head at the front, a tubular body which starts by the eye, curves down almost to the base, proceeds along then rises at the loop of the handle to another eye and *manaia* head which is the hip and leg. In the space between the upper edge and the sway back of the body are two semicircular motifs (arms) with an oval between them. The curved lower edge of the knife is furnished with six teeth slotted into a groove and lashed through perforations, the cord being taken over the rim in which the slot is situated. The carving is pierced and is three dimensional. The handle is plain with a circular perforation in the butt.

Decorative motifs on the carving are *ritorito* in grooves, i.e. three lines tied at the base bridging and fanning out to the other side of the groove. On the "arms", parallel lines and grooves are used. The presence of the *manaia* motif indicates that this knife had a ritual function. It was originally painted with red ochre. Length overall 25.5 cm.

This *mira tuatini* is illustrated in Forster (1777) and in Cook (1777, Plate 19).

CAPE TERAWHITI

Teiratu's (Te Ratu) people from Cape Terawhiti in the North Island (Forster 1777, 1: 225) had or exchanged: cloak lined with dogskin (*kahu kuri*). Cloak with elegant borders *(kaitaka cloak)*, v. symmetrically wrought in red, black and white (ibid: 226). Bodkin of whalebone *(aurei)*, bodkin of green jade *(aurei)*, belt of close matting *(tatua)*. Bone combs *(heru)*, carved calabash for oil *(ipu)*, (not collected). Hatchet — blade of green jade, handle curiously ornamented with fretwork *(tokipoutangata)*. Trumpet tube of wood, 4 feet long (1.22 m) and straight with 2 inch (5 cm) mouth, 5 inch (12.7 cm) bell *(pukaea)*. Trumpet, large whelk mounted with carved wood mouth *(putatara)*. Trumpet, widest at midpoint with hole in middle, another at each end *(putorino)*.

As well as arms, tools and dresses, ornaments "they had greater quantities of these things than any New Zealanders we had seen" (ibid 229). These people had a double canoe fifty feet (15.24 m) long with a high stern and a prow curiously carved with spiral and fretwork lines with a human figure in front as seen on Cook's First Voyage (Forster 1777, 1: 228).

Artefacts

Clothing

Dogskin cloak i.e. lined with strips of dogskin. There are no dogskin cloaks in the Forster or Sparrman collections.

Cloak with patterned border of red, black, and white. A *kaitaka* cloak. The colours suggest an East Coast style of *taniko,* rather than northern South Island or Taranaki where the colours are black, brown, and natural. No cloak resembling this description is included in the collections.

Wörlitz 73. A double pair twine cloak with shaping (Germer 1975: 91). No more exact description is available. Length 125 cm, width 84 cm.

Göttingen cloak. Kaeppler (1978) recorded a cloak but this was not seen and no description is available.

Ornaments

Oxford 124 (Ashmolean No. 1316). Bodkin of whalebone (*aurei,* cloak pin). A curved ivory cloak pin very finely made with perforation at the top end. Length 15.5 cm, width 5 mm.

Oxford 125 (Ashmolean No. 1317). A curved ivory cloak pin. Length 12 cm, width 5 mm.

Göttingen. Two cloak pins of ?seal teeth (Kaeppler 1978: 179). These were not seen.

Bone combs

Stockholm 1799.2.1. Bone *heru.* Flat with rounded top and knob at the side, joined at the base. Fifteen teeth about 7 cm long. (Soderstrom 1939: 57). Length 32 cm, width 12.2 cm, length of teeth 7 cm.

Göttingen OZ 293. Bone *heru.* Flat, with rounded top with knob at the side, twelve teeth at the bottom. Made from a flat piece of whalebone with an attrition saw. The knob is attached at the bottom. Length 16 cm, width at knob 8 cm, length of teeth 5 cm.

Oxford 171 (Ashmolean No. 1162). Bone *heru.* A long bone comb with rounded head and knob at the side. There are eighteen intact teeth, with one each side broken off. There are two small holes on the edge opposite the knob, one just above the teeth, the other 7 cm above it. The knob has a neck attaching it to the comb at the side. Length 34.5 cm, width 11 cm, length of teeth 7.7 cm.

Adze

Oxford 109 (Ashmolean Museum No. 1159). *Tokipoutangata.* Ceremonial adze i.e. "a hatchet of green stone, the handle curiously carved" (Gathercole n.d.) depicted in Cook (1777, Plate 19), also in Forster (1777).

A fine greenstone adze in a carved haft. The adze is held in place with a few lashings of twisted flax cord passed through a perforation in the blade. These have been tightened by wrapping at the sides. The heel of the haft projects up and slightly forward. On this is placed a human figure facing the handle. The head is on the projecting part with a tongue which projects onto the handle. The arms and legs are indicated by carving patterns. The tongue tip touches a raised lizard motif on the top of the handle which the hands are gripping. At the end of this motif a spiral is placed on either side of the handle, which is circled with a series of spirals at this point. The only other carving is a *manaia* head at the end of the handle. There is a mask on the haft behind the blade, i.e. at the end of the toe. The carving style is East Coast North Island but with some details linking it to the Horowhenua or the South Taranaki area, notably the use of three ridges and two grooves as the *haehae* element in a spiral, the *pakati* notches being long drop shapes. Length 46 cm.

Musical instruments

Oxford 116 (Ashmolean No. 1153). Trumpet (*putorino*), widest at mid-point. *Putorino* — a flute-trumpet made from two pieces of hollowed wood bound together, flax at the top, mingimingi vine above and below the central hole and at the base. There is a head in low relief carved at the top point of the flute between the topmost and the next lashing. There is no other carving. The mouth has a tongue with a knob on the lower lip and two branches to either side of the mouth. The style of carving is South Taranaki rather than East Coast. Length 51 cm, width 5 cm, thickness 3.5 cm.

?Berlin VI 420. Putorino. A flute-trumpet made in two pieces bound together with four spaced sets of bindings of rolled flax cord, of 9, 10, 8, and 7 turns, above the central hole, and four below it. The central hole is decorated with a head in low relief, the mouth being the hole. Style of carving is East Coast. This *putorino* was on display and could not be measured. Museum records attribute this item to the Forster Collection. Length *c.* 35 cm.

The four foot long (1.22 m) trumpet has not been located in any museum.

The shell trumpet was depicted in Cook (1777, Plate 19) and in Forster (1777). This is not the shell trumpet depicted in BM ADD MS 15,508 f32 as stated by Kaeppler (1978: 184). The trumpet depicted in Cook (1777, Plate 19) has many points of similarity but differs in detail. The other items depicted, the *tokipoutangata* and the shark tooth knife, now in Oxford, are shown with great accuracy. There is no reason to regard the shell trumpet drawing as being any less accurate. In the drawing the shell has detail differences and the mouthpiece has a bulbous end rather than a straight one as in BM ADD MS 15508 f32. The latter is identical to the trumpet in Cambridge (25.374). Moreover the drawing is by Sporing who died on the First Voyage (Lysaght 1979: 40). The style of carving of the trumpet in Plate 19 (Cook 1977 is very similar if not identical to East Coast examples. The shell has a large *matai* insert in the back, possibly as a repair but more likely as a resonator. Such inserts are not uncommon on *putatara*. The original Forster trumpet has not been located.

EAST COAST

A Chief of Blackhead, East Coast, with a bunch of albatross feathers in each ear (Forster 1777, 1: 484) traded his *mahe-epeh (Maipi = taiaha)* or battle axe which was perfectly new, its head well carved and ornamented with red parrot feathers and white dog hair (ibid: 485).

The chief of Blackhead was Tuanui who put out from "Poureerere". His descendants still live at Porangahau, Hawkes Bay (Beaglehole 1961: 279). His *taiaha* was given to Cook.

BAY TO WEST OF CAPE TERAWHITI

Natives clad in shaggy cloaks (Forster 1777, 1: 491) exchanged: a few of their fishhooks.

There are no traceable fishhooks in the collections.

The Material Culture During the Second Voyage

From the few artefacts which are well localized, it is possible to begin to define the local material culture of the tribal groups present in Queen Charlotte Sound at the time of the Second Voyage. These items have been described in detail, the details being summarised here.

LOCAL

Cloaks

1. Weft double-pair twine or single pair twine (canvas weave).
2. Warp includes spaced black and brown lines.
3. Sides finished with extra brown cord.
4. Bottom and top of weft cut off.
5. A brown and black braid may be used as a hem.
6. Strips of dogskin are added to the corners by half-hitching after the cloak is finished.
7. Shaping may or may not be present.
8. *Taniko* where present can be finished with a braid.
9. *Taniko* simple in design with black and brown triangles, or plain black as decoration.

Weapons

1. Irregularly shaped greenstone *mere*.
2. Whalebone *patu* with definite handle area.
3. Basalt *patu* with no expansion of the butt or with expansion and a flat "squashed" pommel.
4. Wood *wahaika* with carving in Wanganui style, *manaia* on butt.
5. *Taiaha* club — eyebrows and mouth with *pakati* but no spirals.

Ornaments

1. Irregular greenstone ear ornaments.
2. *Dentalium* shell necklaces.

NORTHERN SOUTH ISLAND

Weapons and bailer

1. *Patu paraoa* short and heavy and slightly expanded butt.
2. *Wahaika* wood carved in a Taranaki - Cook Strait style.
3. *Taiaha* with interlocking crescents on the eybrows and mouth.
4. *Pouwhenua* club with carving in a Taranaki style.
5. *Tewhatewha* club.
6. Canoe bailer with mask in Taranaki-Wanganui style.

OTHER SOUTH ISLAND

1. Greenstone adzes.
2. Bone toggle with chevron lines.
3. Wooden flute decorated with diagonal lines.

WANGANUI - TARANAKI

1. Chisel ear pendant in greenstone.
2. Kinky pendant in nephrite.
3. Hafted adzes and chisels.
4. *Hei tiki* with body wider than head.
5. Bundles of human teeth.
6. Shark tooth knife with *manaia* on it carved in Taranaki style.

CAPE TERAWHITI

Cloaks

1. *Kaitaka* cloak with red, white and black border (?diamonds).
2. Double pair twine cloak with shaping.

Cloak pins

3. Ivory cloak pins

Combs

4. Bone combs

Ceremonial adze

5. *Tokipoutangata* adze carved in an East Coast - Horowhenua style.

Musical instruments

6. *Pukaea* trumpet
7. *Putatara* shell trumpet
8. *Putorino* trumpet-flute

In general there is a cultural similarity between the Queen Charlotte Sound area and other northern South Island groups. This extends in some respects to the Wanganui - Taranaki area with a Wanganui style being used for carving in the Queen Charlotte Sound area and a Taranaki style being present in other areas of the northern South Island. There

is, however, a distinctly Queen Charlotte Sound variety of the northern South Island culture. Southern South Island or more strictly Kai Tahu tribal items are few. Except for the crosshatching on a flute and a toggle there is nothing that can be defined as Kai Tahu.

Both the North Island groups are distinctive. While the Wanganui - Taranaki groups share cultural items with the northern South Island and Queen Charlotte Sound there are distinctive items not recorded at this time for the South Island groups. This is more noticable with Te Ratu and his tribal group who had a number of items, the combs, the *tokipoutangata* adze and the trumpets which were not collected from any of the other groups. The cultural status of this group would appear to be East Coast but with affiliation with the West Coast area either by trade, relationship, or war.

THE THIRD VOYAGE

Captain Cook returned to New Zealand in February 1777, to stay for thirteen days at Queen Charlotte Sound.

The *pa* at Motuara which had been deserted on the Second Voyage visits had been newly repaired although it was uninhabited. Webber, the artist with the expedition did a sketch of the main house which is shown with a carved lintel and doorposts. Unfortunately he did not do a close-up of the carving. (BM ADD MS. 17,227 f8 and 15,513 f6). In the last sketch of the whole *pa,* Webber placed some figures in the *pa* for scale.

People in the Sound did not include Te Ratu who had left the area nor Te Ringapuhi of Tory Channel whose tribe had been attacked five months before. Women of the tribe were said to have been taken to Admiralty Bay (Beaglehole 1967: 67). One of the locals from the Second Voyage was Kahura who had taken the Adventure's boat on the Second Voyage (Beaglehole 1967: 62). Another was Pedro or Matamouah who was met at Grass Cove, he was known from the Second Voyage (Beaglehole 1961: 576) and was married to Peteree's daughter (Beaglehole 1967: 65).

On the 21st February Cook was "visited by a Tribe or Family I had never seen before, consisting of about thirty persons, men, women and children. They came from the upper part of the Sound and were some of the finest people I have ever seen in this place; the chief's name was, Tomatongeauooranue (Tamatangiauuranui), a man of about forty-five years of age with a fine cheerful open countenance, two things more or less remarkable through the whole tribe" (Cook in Beaglehole 1967: 65). Bayly, the astronomer, called him "the Raining (sic) chief of the Sound and with him 20 of the finest young men I ever saw". (McNab 1914, 2: 221).

Anderson records the same group as being in seven canoes who bartered cloths, spears, clubs etc. and went to live on the beach (Beaglehole 1967: 801). This was on the 21st and 22nd February. On the 24th, Samwell records two or three large canoes full of men with many articles to trade, *ahu* (cloaks), green images called *tigis,* stone adzes etc. (Beaglehole 1967: 1001). One of these contained Kahura who came from the Southeast part of the Sound.

Another group who were known were the Otago party which included Korako. Two of the boys Tawahirua (Te Wehirua) or Tiarooa and his servant Koa agreed to go on board and accompany Omai to Tahiti (Beaglehole 1967:70). The groups who came do not appear to have been hostile to each other suggesting that they were all in peaceful relationships or, possibly, related. This would suggest that they were all from the immediate area at the time. The period of time was too short for more distant groups to arrive.

Items recorded as being traded:

1. Locals and those whose dwelling was not far off, brought (Beaglehole 1967:797): curiosities, fish, women, clothing, weapons.
2. Two or three large canoes including Kahura from the Southeast part of the Sound. (Beaglehole 1967: 1001): *Ahu* (cloaks), green images called *Tigis,* stone adzes.
3. Tamatangiauuranui's party in seven canoes with 100 plus people, bartered (Beaglehole 1967: 801): cloths, spears, clubs, etc.

Items mentioned by Anderson in his general account are (Beaglehole 1967: 809-815):

New Zealanders dress, oblong garment five feet [1.52 m] long, four broad often ornamented with dogskin or chequered at the corners. Worn with two corners over the shoulder. They fasten it on breast and belly. Long mats, some cloaks with feathers or dogskin or dogskin alone worn as a covering. Long over-mats which reach heels or commonly a covering of sedge.

Ornaments, feathers or combs of bone and wood adorned with pearl shell, or leaves.

Ear pendants of jasper, cloth, beads.

Tiki of greenstone with eyes of pearl shell hung around the neck.

Women, necklaces of shark teeth or made from leg bones of small birds or a particular shell *(dentalium).*

A few women wear triangular aprons decorated with parrot feathers and bits of pearl shell and some have caps of bird feathers.

Fishing nets and wood and bone hooks.

Canoes often have a large head of a man in a rage. Some canoes large with no outrigger, small ones usually have an outrigger, or are double canoes.

Adzes and chisels, gouges of greenstone and basalt.

Paddles, four or five feet [1.22-1.52 m] long, narrow and pointed.

Carving on most trifling things.

Small saw edged with teeth for cutting up bodies of enemies.

Weapons, spears - five, twenty, thirty feet [1.52, 6, 9.1 m] long, for pushing.

Darts for throwing.

Patoo 18 inches [0.45 m] of wood, stone and bone.

E'mee the halberd or long club.

Many collections were made on the Third Voyage but the only ones which can be clearly identified are those in Leningrad given by Anderson to the Governor of Kamchatka (Kaeppler 1978: 46) and the Webber collection in the Berne Historical Museum. The Leningrad collection contains no New Zealand items and the Webber collection contains only six items.

Artefacts

Clothing

Berne 23. Kaitaka cloak made with double pair twine with 5 mm between wefts. There is shaping at the centre with one line becoming two at 44 cm from the base, one line, one line becoming two at 13.5 cm and one line becoming four at 7 cm. The neck hem is turned under with a rolled plait of brown and natural, the sides have a brown and natural braid, one centimetre wide. The *taniko* at the base is 11 cm wide. The pattern is in three blocks on black. The centre pattern is a series of horizontal chevrons repeated eight times. The chevrons are made with small natural and brown triangles. The chevrons are ten lines deep made with every third peak being broadened into a large natural colour triangle with inside it three brown triangles or three small squares in brown. There are three rows of these large triangles. The upper and lower row contains triangles, the middle row from the left has two natural triangles with small squares and brown triangles with black squares, another natural triangle, then two brown triangles, one brown triangle with one natural square and two black, then another black triangle with brown squares. The two side patterns are on a background of small black and brown triangles. On this are vertical chevrons made with natural coloured small triangles. These are grouped in threes and twos, then opposed to form seven central large diamonds so that there are two and a half diamonds in each row, with the half being alternated top and bottom. Some of these diamonds have additional motifs in the centre. Those on the centre line have additional small diamond motifs, one on the upper line and one on the lower line. This applies to the left hand block. On the right hand block, the two centre diamonds at either end have smaller diamonds inside, otherwise the diamonds are filled with the background, small black and brown triangles.

Strips of dogskin have been added to the taniko by half-hitching after it was completed. These decorate the lower edge and sides of the taniko. Some of these strips have disappeared and only a few hairs are left on the others. The taniko style resembles later Taranaki examples. Width at top 174 cm, width at bottom 183 cm, depth 123 cm.

Cloak Pins *(Aurei)*

Berne 3. Two bone cloak pins, long and curved. One has a knob for attaching a cord (still present), the other a lateral perforation. Each has a rolled cord. Lengths 13.5 cm and 14 cm, width 1 cm and 1 cm at centre, thickness 1 cm and 1 cm at centre.

Berne 5. Ivory cloak pin of curved shape with a dorso-ventral perforation and rolled cord. Length 15.5 cm, diameter 7 mm at top, 5 mm at bottom.

Weapons

Berne 2. A *patu onewa* basalt club with five grooves on the butt and perforation with a cord of round plait. The butt expands slightly. Length 36 cm, width of blade 9.5 cm, thickness at handle 2.5 cm, thickness at blade 1 cm.

Musical instruments

Berne 4. Wooden *nguru* flute in reddish wood *(? matai)*. A short curved flute with two finger holes on the body at 1.1cm and 3.1 cm from top, another at 6.3 cm on the curved tip, with a further hole under the tip. A well-made simple *nguru* with suspension hole at

back made by excavating into the body. There is a rolled flax cord in the hole, doubled and knotted at the end. The flute is undecorated.

Fibre

Berne 1. Two hanks of flax fibre, length 54 cm.

THE MATERIAL CULTURE OF THE THIRD VOYAGE

1. *Kaitaka* cloak.
2. Cloak pins, bone.
3. Cloak pins, ivory.
4. Basalt *patu*.
5. Wooden flute.
6. Fibre.

These are all the items which can be clearly identified as having been collected in Queen Charlotte Sound on the Third Voyage. The cloak has a Taranaki style *taniko* but the side braids and extra brown cord at the upper hem are similar to other cloaks collected in Queen Charlotte Sound from people local to the Northern South Island. This would suggest that in the cloak there is an admixture of elements from both sides of Cook Strait such as would be appropriate to a group like that of Tamatangiauuanui. The style of the butt on the *patu* would also suggest influence from the other side of Cook Strait. The cloak pins are similar to those collected on the Second Voyage from Te Ratu's group. Unfortunately *nguru* flutes are not included in the Second Voyage collections.

THE BELLINGSHAUSEN VISIT

On May 27, 1820, F.G. Bellingshausen with two ships of the Russian Navy dropped anchor in Queen Charlotte Sound. He stayed there for ten days then sailed without calling at any other port of New Zealand. The collection made during those ten days is in the Miklukho-Maklay Institute of Ethnography in Leningrad. A further collection made by his astronomer, Simonov, is in Kazan State University.

Bellingshausen, like others in the Russian Navy, saw the explorations of Cook as the model to follow. The spirit of Cook and the scientific emphasis of his voyage were the guiding light as were the volumes of Cook's Voyages. The call at Queen Charlotte Sound was no accident, (see Barratt 1979: 13).

When Bellingshausen moved into Queen Charlotte Sound he followed Cook's chart and anchored off Motuara. Two canoes containing 23 and 16 men rowed up. The canoes had "at the prow, open carvings with snail patterns and a representation of a human head with tongue protruding, the eyes being made with shells. The stern rose up about 6 feet [1.8 m] — a beam set at right angles to the craft. The oars were shovel-like as are those of all the peoples of the South Sea", (Barratt 1979: 30).

The men, or rather the principal ones were tattooed and were dressed in a cloak fastened at the breast with a bone or piece of basalt. Over this they had a thick cloak like a felt cloak.

Bellingshausen later moved to near Cook's anchorage just off the south head of Ship's Cove. Two more canoes followed them and the same group as before traded fish and "articles of native manufacture" (ibid: 32).

On May 31, Bellingshausen went to visit a village, a small settlement in Cannibal Cove which consisted of three small, low huts. There the chief presented Bellingshausen with "a piece of cloth made of New Zealand flax, with a patterned border" (ibid: 36).

They then moved on to visit the chief who had visited them at the ship in what is now Little Waikawa Bay. This was a settlement with a palisade on the seaward side, with a gate. Houses were set either side of a stream, the edges of which were paved with cobblestones and which was crossed by a bridge. The chief's house was made with three rows of posts. "The central posts were twice as high as a man and on each of them an ugly human figure had been carved and decorated with red colouring. The wall posts were a fraction lower than the shoulders of a man. On the walls were matting, fine mats were on the wall and there were pikes 24 feet [7.3 m] long on the walls together with a staff, various insignia of a chief, and human figures carved out of wood and painted red. The other dwellings were not so finished." (Barratt 1979).

While in this settlement they obtained (ibid: 38): several weapons, various artefacts by barter.

The chief brought out an eight foot long (2.43 m) staff, the top halbert shaped, carved and inlaid with shell eyes, while the bottom was like a narrow paddle. This is a *taiaha*.

On June 3, Bellingshausen went to explore the interior of the Sound, he saw some huts but no settlements. While he was away people had come and bartered (Barratt 1979: 40): spears, various carved boxes, fishhooks, staffs, the insignia of chiefs, bludgeons of green stone, axes, various clasps and ornaments of green basalt, cloths.

"The inhabitants of Queen Charlotte Sound cover their bodies, from below the chest to half-way down the thighs with a piece of white woven material, tied round by a narrow belt. Round the shoulders they throw a very deftly woven piece of white or red cloth, edged with a dark border. This is fastened at the chest by pins, four or five inches [10.1-12.7 cm] long, made of green basalt or of bones . . . When it is cool, the natives wear, over the outer clothing, a shaggy cloak, (Barratt 1979: 41).

Other adornments mentioned are: pieces of birds skin with white down, through the ears. At the breast, ugly human images. A little knife made of green stone, or little bones.

Arms — slender, straight, sharply pointed wood spears up to thirty feet [9.14 m] in length, short bludgeons made of green stone or bones. Taiaha — (halbert with hideous face), tewhatewha (shaped like an axe), these are the insignia of chiefs. Canoes — largest 47 feet [14.32 m] in length.

The number of inhabitants did not exceed 80 in the month of June, 1820. "The natives have now supplemented their former food supply with the splendid potato, not inferior to the English . . . which they grow in their garden plots" (Barratt 1979: 44).

THE LENINGRAD COLLECTION

Artefacts

Clothing

Leningrad 736.125. Korowai cape with natural colour tags. Made with double pair twine 8 mm apart; shaping is provided by five inserts at the shoulders and six at the bottom. The top hem is braided, the weft finished with a fine rolled cord of natural and black. There is a fringe on three sides. Width 133 cm, depth 100 cm.

Leningrad 736.126. Korowai cape with natural coloured tags made with double pair twine one centimetre apart. Otherwise identical to 736.125. Width 140 cm, depth 100 cm.

Leningrad 736.136. Rain cloak made with *cordyline* fibre with some *Freycenettia banksii* strands. Single pair twine weft 3.5-4.5 cm apart. One line of shaping at the bottom. The neck band is rolled, and the sides plaited off *(kahu toi)*. Width 135 cm, depth 100 cm.

Leningrad 736.132. Pihepihe cloak made with double pair twine 1 cm apart. The top is rolled, the sides tied off and there is a fringe on three sides. The body of the cloak is decorated with fine rolled strips of flax leaf with scraped and black dyed sections and some plain fibre tags. Width 153 cm, depth 120 cm.

Leningrad 736.134. Rough cloak made with double pair twine 1 cm apart. Shaping at the shoulder of six inserts and at the buttock, nine inserts. The neck band is rolled with a fine tag fringe. The body of the cloak is covered with thick black and natural rolled tags. Length 140 cm, width 116 cm.

Leningrad 736.133. Pihepihe cloak. Weft double pair twine 1.2-1.5 cm apart. There is shaping at the shoulder of five inserts and at the buttocks of six inserts. There are fine tag fringes on three sides. The body of the cloak is covered with fine rolled flax strips with scraped areas dyed black. Width 154 cm, depth 115 cm.

Leningrad 736.135. Heavy, double, woven as one piece with a fringe on the lower edge, made of brown coloured vegetable fibre. This cloak was not seen. Description is from Barratt (1979: 111). Length at top 157 cm, length at bottom 284 cm, depth 106 cm.

Leningrad 736.128. Unfinished weaving part of an aronui cloak. The bottom edge is a black and natural braid 1.7 cm wide. The side edge is a strip of taniko with spaced diagonal stripes of natural barred with black like a ladder with plain areas between them; black with small natural diagonal bars then small black and brown squares also in the centre of the black, a ladder plain black, ladder, plain brown, ladder, plain black, ladder, plain narrow black, ladder, plain black, ladder, plain brown etc. The weft is double pair twine 1 cm apart. Along the bottom edge two weft lines from the edge and two weft lines wide, a strip of taniko is inserted for 28.2 cm in an alternate black and natural barred triangle pattern. Two wefts further in there is another strip 1 weft line wide with brown triangles outlined in natural on black. The warp includes spaced stripes of black and brown alternately (5), three brown stripes with black edges, one brown and black with a black, then six lines of alternate brown and black, three brown and black, one brown and black, three brown and black, five alternate black and brown. The top edge of the weft is finished with an extra brown line. Length 159 cm, depth 23 cm.

Leningrad 736.130 (Fig. 1). *Kaitaka*-feather cloak. A single pair twine, close canvas weave cloak, with double *taniko* on three sides. The neck hem is plaited brown and natural. All the *taniko* has been woven on the same warp threads as the body of the cloak. The cloak is decorated with quillets of pukeko, pigeon and possibly notornis feathers which have been laid on the weaving at 6-8 cm apart and spaced in alternate rows then woven across.

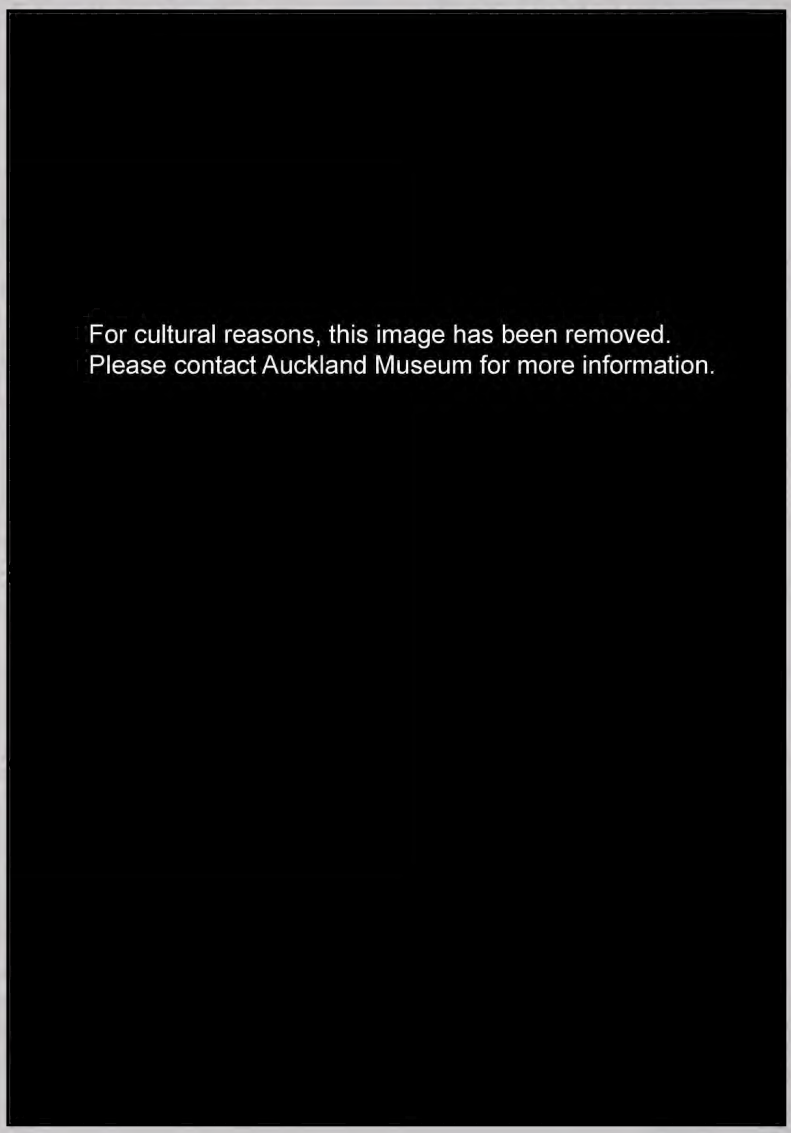


Fig. 1. *Leningrad 736.130*. Canvas weave cloak with feathers and double *taniko*.

At the lower hem the lowest *taniko* is 18 cm deep, at the sides 4 cm. The upper *taniko* reaches to 1 cm above the top edge of the lower *taniko*. At the bottom it is 13.5 cm deep, at the sides 4 cm deep. The hem portion of the upper *taniko* has two vertical chevrons made with small natural triangles, a wider black band then two further chevrons. These are opposed at the other side so that the chevron encloses a half diamond and a full diamond filled with small black and brown triangles. There is then a plain black area with small brown triangles top and bottom, then chevrons enclosing four series of one and a half diamonds filled with black and brown triangles. The centre back of the cloak is black with top and bottom brown triangles, then the same is repeated on the other side. The side *taniko* consists of alternate triangles. From the edge of the cloak triangles with a black base, a plain natural area with two small black squares and in the apex, a diamond with concentric black and natural lines and spot in the centre. From the cloak sides the triangles are filled with smaller triangles of black and natural or brown and alternate black.

The lower *taniko* hem has from the side a black area with natural triangles at the top, brown triangles at the base and a concentric black and natural diamond in the centre. There are then pairs of vertical chevrons with brown between the pairs enclosing 2½ diamonds. Each alternate line of diamonds has a border of natural triangles, the rest filled with small brown and black triangles. These alternate with diamonds filled with larger natural black and natural triangles. The small triangles are in seven lines inside the diamond, the larger size are in four lines, natural pointing up, black pointing down.

In this cloak the natural colour is not golden but a plate creamish white, the fibre being very soft even if the weave is like canvas. Length 110 cm, depth 170 cm.

Leningrad 736.129. Kaitaka. Close single pair twine cloak with double taniko borders on three sides. The upper hem is finished with an extra black and natural cord. The *taniko* has been woven in when weaving. The upper *taniko* ends 4-5 cm above the upper edge of the lower *taniko*. The upper *taniko* at the base is 14 cm deep, at the sides 5 cm. The lower *taniko* at the base is 15.5 cm deep and 7 cm at the sides. The cloak has been shaped by adding extra lines at the centre but these are difficult to see clearly. The upper *taniko* base pattern is black with brown triangles at top and bottom on each side, then paired lines of natural triangles forming vertical chevrons, the pairs separated by brown lines, enclosing diamonds in an alternating series of one and two halves top and bottom and two diamonds. Placed inside these are three triangles apex to top with one triangle below. There are nine lines of diamonds across the base alternating brown and natural interior triangles. The side *taniko* are of alternating triangles apex in apex out, the lines made with small natural lines of triangles in paired lines separated by brown.

The lower *taniko* base has two large blocks of horizontal chevrons forming three downward and three upward peaks. The chevrons are made up like those on the upper *taniko* and consist of five pairs of small natural triangles with brown between them. At the base of each group at the top there is a natural triangle with an opposed black or brown triangle. At the bottom these triangles are filled with small black and brown triangles. At the two sides and in the centre of the base *taniko* there is a black area with brown triangles top and bottom. The side *taniko* is opposed triangles, the inner ones outlined with the chevrons with one pair, a black band then a brown triangle with opposed brown triangle inside. The outer series are outlined with brown triangles on natural, then a black centre with downward chevrons in natural. This cloak may have been decorated with feather quillets as some weft threads have been stretched. Length 116 cm, depth 106 cm.

Leningrad 736.131. Kaitaka cloak. It has *taniko* on the base only. The weft is double pair twine 1 cm apart with shaping at the shoulder of five inserts, at the buttocks of four inserts. The neck band is braided brown and natural. The sides have been finished with a narrow 1 cm band of black then cut off.

The base *taniko* is 15 cm deep. It has three blocks of pattern separated by black. The black area has a diagonal 'damask' type pattern made by raising the stitches and carrying them over two or three lines. The pattern blocks consist of vertical chevrons made with small triangles, a narrow line (single), a space, then a double line. There is a red worsted line in the space. These are opposed to form diamonds, three to a line so that there are lines of diamonds outlined with natural triangles alternating with plain black diamonds. Length 160 cm, depth 112 cm.

Weapons

Leningrad 736.262. Mere. Lake Wakatipu type greenstone. A flat *mere* with the butt expanded slightly into a dome shape. No defined shoulders. There is a perforation with rolled flax cord looped through with two knots. A South Island style mere. Length 37 cm, width of blade 8 cm.

Leningrad 736.115. Taiaha. Two handed club with face and protruding tongue at one end. Two pairs of whorls on the tongue. Mouth and eyebrow ridges decorated with *pakati* and small spirals. Carving style is Gisborne. Made with iron tools. Length 210.5 cm, blade width 8.9 cm, length of head 20 cm.

Leningrad 736.117. Tewhatewha. A two handled club of axe shape with a very rounded "blade" weight and barbs on the point. The barbs are grouped up to 19 cm from the point with three on the left, three on the right, two on the left. Length 130.5 cm, width of blade 11.2 cm.

Leningrad 736.116. Tewhatewha. Two handed club of axe shape with janus head in South Taranaki style made with iron tools. There are split hawk feathers attached through the hole in the blade. Length 170 cm, width of head 21.5 cm.

Ornaments

Leningrad 736.268. Ear pendant, *kuru* type. A greenstone ear pendant of "bodkin" shape which could be mistaken for a cloak pin but is much too thick. It has a transverse hole and is slightly curved and pointed. Length 13 cm, diameter 1 cm.

Leningrad 736.265. Adze pendant with asymmetrical outline, bevel and hole. Length 7.1 cm, width 3.8 cm.

Leningrad 736.268. Adze pendant with curved cutting edge and hole. Length 6.6 cm, width 3.2 cm.

Figures

Leningrad 736.118. (Fig. 2). *Tekoteko,* gable ornament figure, with a ridge for attachment with three holes at the back. The figure has a long body with thin arms, left hand on lower chest pointing up, right hand on stomach. The legs are thin with one broken off

Figs. 2,3. 2. *Leningrad 736.118*. Female *tekoteko* with tattoo. 3. *Leningrad 736.119*. *Tekoteko*. Photo: Miklukho-Maklay Inst. of Ethnography.

below the knee. The head is poised on a thin neck above sloping shoulders. The figure is female with a male spiral facial tattoo with a single cheek spiral on each side. In 1844, Shortland on his journey through Otago recorded "I afterward met with several other old women of this tribe (Kai Tahu) who had . . . engraved on their faces many of the marks, which in the North Island I have never seen but on males" (Shortland 1851: 18). In the North Island, occasionally, male tattoos were put on females, in whole, or in part, to mark a maiden set aside from sex relations of any kind because of unequalled status. Such a female would not appear, as this figurine does, as a *tekoteko,* that is an ancestress. This would indicate a South Island, and more specifically Kai Tahu tribal origin. The figure is carved with stone or iron tools. Length 70 cm, length of head 24 cm, width 12 cm.

Leningrad 736.119. (Fig. 3). *Tekoteko,* gable apex figure of attenuated body form with an attachment hole through the back and an area cut out of the buttocks. The figure has a long body with thin arms, the left hand on the stomach, the right ending at the wrist on the hip. The upper arm has been cut out to leave a peak on the shoulders and elbows. The legs are short with one being broken off. The head is set on a long thin neck sloping from the shoulders. No sex is shown. The figure has a partial tattoo with forehead and mouth rays. The eyes are excavated for semicircular inserts. As with 736.118, the tip of the tongue shows in the mouth and the ear area has holes for the attachment of decoration. Length 49.5 cm, length of head 20.5 cm, width 14 cm.

Figure group

Leningrad 736.120. A carving of four figures in Gisborne style made with stone tools. This is carved in the round and forms a 7 with a figure with median crest on the top and with feet to the head of the topmost of three figures. The upper figure of the three is a male copulating with a reversed female. The male's feet are on the hips of the female, her feet on his stomach. The head of the female rests on the knees of another male whose penis rests on the top of her head. There is an attachment point which has broken off behind the head of the lowest figure. No other attachments are obvious. Length overall 84 cm, width 10 cm, the length of the extension 25 cm.

The purpose of this carving is unknown.

Feather boxes

Leningrad 736.124. Papahou, flat feather box.

A rectangular box, with heads as handles either end, joined onto low relief bodies on the base. The heads and base carvings are carved with stone tools. One of the figures is male, the other female. Both have hands on the abdomen, feet curved to join in the centre. The two figures are separated. Both figures are decorated with double spirals made from three *haehae* grooves and one outer notched or *pakati* groove. At intervals along each element the three grooves and notches are "bound" with three transverse grooves. Between the figures are open double spirals; each element being made of long transverse and some longitudinal notches. The elements are separated by transverse bunches of grooves. The carving style is that of the South Taranaki - Wanganui area, also found in the northern South Island. The lid of the box has been carved with metal tools. It has two figures on each end, with heads on the top of the handles with two figures, one a female, which take

up a third of the box at either end leaving a third of the lid for decoration. The background decoration on the lid and the carving on the two sides of the box is "rolling spirals" or *unaunahi*. The figures on the lid have domed foreheads and are carved in the same style as the decoration, that of the Hokianga area of Northland. Length 60 cm, width 18 cm, depth 12.5 cm.

The box was originally carved with stone or possibly soft iron tools. At that time the handles and base carving were completed. At some later date a carver working in the Hokianga style has completed the box with a metal tool, possibly a nail or something that can be used to make a hard edge. The most likely explanation for the disparity in styles is that the box was souvenired by a northern raider who completed the carving. It later found its way by gift exchange to Queen Charlotte Sound. Such raids had reached as far as Taranaki as early as 1810 (Smith 1910: 61).

Leningrad 736.123. A *wakahuia*, oval feather box, with heads as handles joined onto female bodies at each end of the box. The box is girdled lengthwise and transversely by *haehae* grooves with *pakati* inside forming interlocked ovals. On the base the rest of the box is decorated with *haehae* and *pakati* placed diagonally in each quarter to form a large spiral effect. On the lid two major bands form chevrons from the centre, the rest of the area being filled by curved *haehae* and *pakati* decoration. The box has been made with stone or soft iron tools and is in the carving style of Gisborne on the East Coast of the North Island. Length 64 cm, width 26.2 cm, depth 11 cm.

Leningrad 736.122. *Wakahuia*, oval feather box with heads as handles joined to bodies at each end of the box. The base of the box has a large spiral on either side with diagonal *haehae* and *pakati* over most of the rest of the box. The lid has lengthwise *whakarare*, a central groove and notch line with inturned points. There are three transverse lines, centred at each end of the *whakarare*. The box is carved with metal tools and is not completed. The carving style is that of Gisborne or the East Coast of the North Island. Length 53 cm, width 22 cm, depth 11.5 cm.

Leningrad 736.121. *Wakahuia*, over feather box with heads as handles but no bodies. The base has a spiral each side with *pakati* and *haehae* angling from the centre to the top of the box. The lid has fine *pakati* and *haehae* lines from the sides which roll into a double spiral then continue to the other side. There is a median line of *whakarare*. Carved in Gisborne style with metal tools. Length 49 cm, width 11 cm, depth 10 cm.

Paddles

Leningrad 736.113. *Hoe*, paddle. A flat war canoe paddle with gymnast figure on the handle in Taranaki style. The front of the blade is decorated with a male figure with ridged serpentine body, one arm passed through the mouth, the other passed under the legs, the hands being placed either side of a horizontal section of the body. Decoration on the figure is *ritorito* (Prince of Wales feather, or three lines tied at the base) and long diamond notches. A serpentine line of three rows of long diamond *pakati* joins a sideways figure about halfway down the blade. At intervals along this meander are twists made of two elements which reach out to the side of the blade. The sideways figure is female and, except for the half face, is identical to the figure at the top. The style of this carving is clearly from the central to southern area of Taranaki as is the form of the paddle itself. Length 232.5 cm, length of blade 108 cm, width of blade 12.5 cm.

Leningrad 736.114. Hoe, paddle. A canoe paddle with flat blade painted on one side with *mangopare* (hammerhead shark patterns). The butt of the handle has been a round knob but is now broken. At the loom of the blade a head is carved in Gisborne style with iron tools. Length 178.5 cm, width of blade 12.8 cm, blade length 87 cm.

Leningrad 736.168. (Fig 4). *Hoe,* a paddle with broad dished blade markedly concave-convex front and back. The blade ends in a blunt hook similar though not as large as those on Mangarevan paddles. The back of the blade has a median ridge. On the front of the blade stretching from the loom of the handle to halfway down, figures have been roughly carved with stone tools. There is an upper female figure with protruding tongue being entered by a penis from a reversed head at her feet. No body is shown for the lower figure. The figures are undecorated but the general style can be characterized as Wanganui - Horowhenua i.e. a Cook Strait style. The handle ends in a square flat knob. Length 200 cm, width of blade 16 cm, length of blade 110 cm, length of carving 40 cm.

Fig. 4. *Leningrad 736.168.* Detail of paddle (front).

Leningrad 736.173. Hoe, a paddle with broad dished blade markedly concave-convex and ending in a blunt hook. There is a median ridge on the back. On the lower section of the back, stone tool marks show that the final dressing of the blade was from the ridge to the edge. The handle ends in an expanded flat knob. Length 197.5 cm, length of blade 110 cm, width of blade 15.3 cm.

There is one other paddle of similar manufacture in the Leningrad collection, 5754.49 a dished paddle with Wanganui - Taranaki carving on the front of the blade.

Adzes

Leningrad 736.264. Nephrite adze (not seen). Length 20.3 cm, thickness 2.4 cm, width 4.7 cm.

Leningrad 736.267. Nephrite chisel of flat cross section. Length 8.4 cm, width 2.4 cm, thickness 0.7 cm.

Leningrad 736.263. Asymetrical nephrite adze (not seen). Length 14 cm, width of blade 6.4 cm.

THE KAZAN COLLECTION

I.M. Simonov was the astronomer with Bellingshausen. He was a young professor at Kazan University and on his return presented a collection to his university. This is now in the Museum of Kazan State University at Kazan (Barratt 1979: 14, 106). I was not able to visit Kazan so the information is taken from the translation of descriptions by Kabo and Bondaryov in 1974. (Barratt 1979: 111-113).

Artefacts

Clothing

Kazan 7. Korowai cloak of flax of light brown colour. Single pair twine 1.5-2 cm apart. Decorated with self colour tags 10-14 cm apart. Dimensions 138 x 80 cm.

Kazan 8. Specimen of hand weaving. Ornamented with seven dark-brown parallel bands in the warp 17-20 cm apart. Dimensions 136 x 114 cm.

Kazan 9. Specimen of hand weaving. Unfinished *korowai* cloak with tags 20-25 cm apart dyed dark brown. Dimensions 136 x 6 cm, warp ends 65 cm.

Kazan 10. Specimen of hand weaving, unfinished. *Korowai* cloak with clusters of alternate light and dark brown tags 26 cm apart. "The two ends of this piece are dyed dark brown. One end is very thin, the other — as much as 3 cm thick" (Barratt 1979: 113). Dimensions 141 x 7 cm, warp ends 60 cm.

Ornaments

Kazan 3. Nephrite ornament in the form of a triangle. The edges have been rounded, the sides notched. An adze pendant.

Kazan 6. Necklace of univalve shells threaded on vegetable fibre. Thirteen shells.

Fishhooks

Kazan 4. Composite fishhook made of a bent piece of wood 24 cm long. Barbed bone point attached by twine. Twine around snood.

Kazan 5. Composite fishhook made of a slightly bent piece of wood 10 cm long. Barbed bone point lashed on with twine. Snood still attached.

Adzes

Kazan 1. Adze of nephrite sharpened on two sides, tetrahedral sections. Length 22 cm, width 5.5-2.5 cm.

Kazan 2. Adze of nephrite almost rectangular cross-section. Length 17 cm, width 5.5-2.5 cm.

THE MATERIAL CULTURE IN 1820

Clothing

Various types of cloaks
(a) *Korowai* self-coloured tags, double pair twine.
(b) *Pihepihe* cloaks, *piupiu* tags, shaped, double pair twine.
(c) Rough cloaks, tags, shaped, double pair twine.
(d) *Kahu toi* rain cape, single pair twine, shaped.
(e) *Aronui,* striped warp, double pair twine, *taniko* in weft, braid.
(f) *Kaitaka* — feather, single pair canvas weave, double taniko three sides, Taranaki style.
(g) *Kaitaka* single pair as (f).
(h) *Kaitaka* double pair, shaped, base *taniko,* black at sides.

Weapons

1. *Mere* of "Irregular" shape.
2. *Taiaha,* Gisborne style, spirals on brows.
3. *Tewhatewha,* barbed point.
4. *Tewhatewha,* South Taranaki carving.

Ornaments

1. *Kuru* pendant of nephrite.
2. Adze pendant.
3. Univalve shell necklace.

Carvings

1. *Tekoteko* — female with male tattoo Wanganui style carving.
2. *Tekoteko* — male tattoo Wanganui style carving.
3. Figure group in Gisborne style.

Feather boxes

1. *Papahou* — base Wanganui style, sides and top Hokianga style.
2. *Wakahuia* — Gisborne style.

Paddles

1. Flat — Taranaki.
2. Flat, painted, Gisborne carving.
3. Dished, Wanganui style carving, hook.

Adzes

1. Nephrite adzes and chisels.

Fishhooks

1. Composite wood and bone hooks.

In the 1820 collections there are items clearly obtained by trade, gift exchange or war from areas outside Queen Charlotte Sound. These include the *taiaha,* the figure group, a paddle and two *wakahuia,* all in Gisborne style from the East Coast of the North Island. These indicate a fairly close relationship of some sort with the East Coast possibly by way of Cape Terawhiti and Palliser Bay. The *papahou* feather box with its curious mixture of tools and carving styles suggests perhaps that one of the Ngapuhi who went south with one of the early musket raids to Wanganui may have stayed there and finished a box which by gift exchange reached Queen Charlotte Sound (e.g. from Murupaenga's raid in 1810, Smith 1910: 61). There are other items which continue the influence noted on the Third Voyage from the Taranaki area, either directly or by way of the other areas of the northern South Island. The direction of this influence may be indicated by a striped *aronui* cloak with *taniko* inserted in the weft collected by Dumont D'Urville in Tasman Bay, Nelson in 1826. This cloak which is closely similar to the unfinished pieces in Leningrad and Kazan is now housed in L'Hôpital de la Marine at Rochefort, France. Another striped *aronui* cloak with *taniko* on three sides with two larger blocks at the bottom corners is housed in Le Musée des Antiquites Nationaux at St Germain en Laye. This cloak, also probably collected by D'Urville in Tasman Bay in 1826 has Taranaki style *taniko* patterns similar to those on the Webber cloak in Berne.

The techniques of cloak manufacture would appear to have remained stable although shaping in the cloaks of double pair twine is general rather than rare.

Cloaks with chestnut brown and black stripes in the warp are a feature of South Island weaving (Simmons 1968: 10). Such cloaks are not part of the North Island repertoire in the later collections.

The single-pair twine canvas weave cloaks with *taniko* decoration were present in Queen Charlotte Sound on the Second Voyage. Again they are not known outside the Cook Voyage collections, the 1820 collection and a few examples collected about the same time probably in Cook Strait. An example is the cloak in Berlin (No. VI.490) which has a canvas single .pair twine weft, *taniko* with brown and black triangles and feathers attached after weaving with half-hitching. The feathers were originally white black-backed gull but have been dyed pink with soaked out dye from red cloth which has been brushed across them. This cloak was collected by a Captain Hadlock and placed in the Berlin Museum before 1824. Except for one fragment collected in the North Island which can be traditionally associated with a woman of the northern South Island, no cloaks of this type are known from later North Island collections. Sidney Mead (1969: 48-52) places examples of these cloaks as described by Roth (1923) in his D or dogskin class and in K class or *kaitaka,* depending on whether the cloak is decorated with dogskin or not. Mead was not aware of the type of cloak — such as Leningrad 736.129 with canvas weave, *taniko* on three sides and feathers attached in quillets, which can be compared with a similar cloak in the Cook Collection in Vienna (No. 25) with triangle *taniko* in brown, black and natural (white) at the base and feathers attached in quillets, (illustrated Kaeppler 1978: fig. 324). A probable Cook Collection piece in the Hunterian Museum at Glasgow (E422) has base *taniko,* grouped feathers and extra dogskin strips at the side. These would suggest a tradition of close single pair twine cloaks as a feature of Queen Charlotte Sound. A tradition that continued until 1824 in terms of techniques even through the decorative element of the *taniko* had undergone change with new ideas being imported by way of other parts of the northern South Island from the Taranaki style.

The dished paddle with carving on the inside top of the blade and the unfinished example are not matched by comparable items in the collections studied. However two comparisons can be made. In the British Museum there is a similar paddle, No. 1947.Oc4.1 (described below, see Figs. 12, 13); this is depicted in Sarah Stone's water-colours of objects in the Leverian Museum (Force & Force 1968: 128) which included objects from the Second and Third Voyages of Captain Cook (Kaeppler 1978: 47). Another paddle of the same type is in the National Museum of Ireland (Dublin 1894. 352, described below) from the Second or Third Voyage (illustrated in Kaeppler 1978: fig. 406). This type of paddle is again a feature of South Island collections. Skinner illustrated a number of these and described their characteristics as "In general the two sides of the blade do not constitute a flat surface but are set at a wide angle to each other and converge at the back on a median spine. The point of the blade is often so much thickened as to suggest a hook. The spine is a pronounced ridge prolonging the alignment of the shaft. In paddles where the blade tends to flatten, the spine divides in two and spreads outwards. In these respects the South Island paddle perpetuates East Polynesian features which have been lost in North Island Classic Maori" (Skinner 1974: 132-3). A similar paddle is also recorded for Monck's Cave at Sumner near Christchurch (Skinner 1924: 154).

Amongst the weapons, the greenstone *mere* is "irregular" in shape with no butt ridges as compared to North Island examples. These irregular *mere* would appear to be a South Island feature judging by those in Canterbury and Otago Museums.

Cultural influence in 1820 was not confined to trade and designs. Compared with earlier collections there are the *tewhatewha, tiki, kuru* pendants which are not themselves imports but compared to the earlier collections would appear to be cultural borrowings from the North Island.

THE FIRST VOYAGE

When Cook called at Queen Charlotte Sound on his First Voyage on 14 January 1770, the *pa* on Motuara Island was occupied and all the inhabitants were in arms (Beaglehole 1955: 234). Some men came up in canoes with the chief, an old man named Topaa, the first to come on board (Banks in Beaglehole 1962, 1: 460). They were dressed as in Tasman's record "That is 2 corners of the cloth they wore were passd over their shoulders and fastned to the rest of it just below their breast, but few or none had feathers in their hair" (Banks in Beaglehole 1962, 1: 453). On the 16th three small canoes came with about one hundred people including women. "The women in these canoes and some of the men had a peice of Dress which we had not seen before — a bunch of black feathers made round and tied upon the top of their heads which is intirely coverd" (Banks in Beaglehole 1962, 1: 454). The inhabitants were not all peaceful as on the 15th January they brought a dried head to trade. Their canoes are described as elegant and few men were tattooed (Parkinson 1784: 115, 117). Later on the 16 January they saw a not long dead woman floating in a cove and observed dog being prepared for eating and noticed picked human bones said to come from an enemy killed in an attack five days before (Banks in Beaglehole 1962, 1: 455; Beaglehole 1955: 236). On the 19th a group came from another town (Banks in Beaglehole 1962, 1: 457). Cook records that on the next day they saw an oven with human bones and that on the 20th a canoe came with four heads to trade. Banks purchased one (Banks in Beaglehole 1962, 1: 237). Further human bones were seen on January 21 in Motuara (Beaglehole 1955: 239). The other small *pa* (on Long Island) was much like Motuara.

Cook sent a boat to an island and while there the party saw a group of Maori come ashore near a group of houses. The women immediately started a *tangi* (Beaglehole 1955: 242).

On the 4th February Banks records meeting a double canoe which had recently lost a small child eaten by enemies (Banks in Beaglehole 1962, 1: 462). The next day a party of seventeen people was met, led by a young boy of ten who stated he was the owner of the land where they were getting wood (Banks in Beaglehole 1962, 1: 463).

In general Cook notes that the inhabitants of the Sound hardly exceeds more than "3 or 4 hundred people they lieve dispersed along the Shores in search of their daily bread, which is fish and firn roots, for they cultivate no part of the lands . . . This people are poor when compared to many we have seen and their Canoes are mean and without ornament, The little traffick we had with them was wholy for fish for we saw little else they had to dispose of". (Beaglehole 1955: 247).

There were two fortified *pa*, Motuara and one on Long Island and while they had recently undergone an attack, the two *pa* do not appear to have been hostile to each other. Certainly the human bone seen on both *pa* would suggest that there was nothing to fear as there were no related people to take revenge for the insult of seeing their relatives eaten. The heads brought to the ship also indicate that they did not expect to see any relatives of the dead men at the ship. If there had been a war would have started there and then.

The visit to Queen Charlotte Sound was made between 14 January and 6 February 1770. This stay of twenty-one days gave little time for more distant groups to find their way to the Sound.

The collection points for artefacts on the First Voyage included Poverty Bay, Hawkes Bay, Tolaga Bay, Anaura Bay, Whitianga, Thames, the Bay of Islands and Queen Charlotte Sound. With the perspective of the collections studied so far from Queen Charlotte Sound it is possible to identify those items collected at Queen Charlotte Sound with a fair amount of certainty.

The Stockholm Collection

The collection formerly in the Alstromer Museum and now housed in the Ethnographic Museum in Stockholm was given to Baron Alstromer by Joseph Banks in 1778 (Ryden 1965: 54,55), during a visit of Alstromer to Banks and Solander in that year. Banks was on the First Voyage and was also the recipient of items from both the Second and Third Voyages but the date excludes the Third Voyage (1776-1780). The Second Voyage included a visit to Tonga and objects from Tonga are found in Banks' gift to Alstromer. This means that while the gift may possibly be mainly of First Voyage objects, some of them will be Second Voyage. The collection was transferred to its present location in 1848.

Artefacts

Clothing

Stockholm 1848.1.7. A plain double pair twine cloak with no shaping, fringed either end. One side has been finished with a braid which would suggest the cloak was worn with the weft in a vertical position, the braid at the hem. (Ryden 1965: 80 Figs. 29,31,35). Width 110 cm, depth 80 cm.

Stockholm 1848.1.63. (Fig. 5). *Kaitaka,* close single pair weave (canvas weave) with broad *taniko* at the base. On the body of the cloak spaced pieces of dogskin have been attached by half-hitches after the weaving was finished. These appear to have been placed in alternate rows, though only the attachments are left on some. The *taniko* is finished with a brown and natural braid and a similar braid is placed at the top of the taniko. The *taniko* is a most unusual "Greek key" pattern. The background is black on which a pattern has been made with the white natural, in rows of small square spirals and triple white lines which run in four directions diagonally from top and bottom to form large diamond shapes across the taniko. Each diagonal line from the centre of the diamond has successively three, four, six, eight small spirals with three white lines between each row. Width 135 cm, depth 125 cm, depth of taniko *c*. 32 cm, square spirals 1 cm each.

Fig. 5. *Stockholm 1848.1.63*. Detail of *Kaitaka* cloak. Banks Collection.
Photo: Ethnographical Museum, Sweden.

Stockholm 1848.1.6. Shaggy cloak. A rain cape probably double pair twine, shaped at centre, weft lines 3 cm apart. The neck band is plaited. The thatch is rougly scutched flax. Probably North Island. Width 130 cm, depth 110 cm.

Belts

There are five belts in the Alstromer Collection. Four of these would appear to be from Queen Charlotte Sound as they employ decorative features also found on the cloaks.

Stockholm 1848.1.39. Tatua made from finely plaited flax. The edges have been decorated with a brown cord to make a horizontal border. Length 130 cm, width 7.5 cm.

Stockholm 1848.1.38. Tatua of fine flax with decorative brown cord along edge. Length 190 cm, width 8 cm.

Stockholm 1848.1.37. Tatua of plain flax plaited with decorated zigzag stitched chevrons in brown at the end. Length 120 cm, width 6.5 cm.

Stockholm 1848.1.36. Tatua of natural flax with black or brown crosshatch design, the edge decorated with a horizontal brown cord, chevrons in brown at the end. The tie is finely plaited fibre. Length 210 cm, width 7 cm.

Weapons

There are a *patu* and *wahaika* as short clubs in the collection. The *patu onewa* is not from Queen Charlotte Sound and is more likely to have been obtained in Thames. It is what is known as the "Auckland type". The *wahaika* though corresponds with items from Queen Charlotte Sound in having "Wanganui" style carving.

Stockholm 1848.1.1. Wahaika (wood) with a bulge at the side on which a figure is incised, not carved in relief. The butt expands as a round knob. On this there is a face on the upper half with attenuated hands and legs curling underneath it. The figure on the blade has a large round eye which originally held paua, a second circle behind this. The eyebrow is incised with two lines filled with a small double spiral and echoing lines. Beneath the eye a double line filled with vertical lines marks the jaw. A small tongue is shown in a mouth. The face looks rather like a parrot in profile. The body of the female figure is outlined by the arms and legs. The arms are spindly, the hands either side of the stomach. The legs are similarly spindly, the knees touching, feet apart. There is a small spiral on the buttocks. The figure on the butt has an open mouth with four teeth in the four sides and the tip of the tongue on the bottom one. The eyes are round, nose well formed. The arms and legs are very spindly and only just marked by spirals. There is a perforation for the cord. This is a well balanced and well worn weapon. Length 36 cm.

Long weapons in the Banks Collection include a *tewhatewha* which is undecorated. In shape it would correspond more closely with Bay of Islands examples.

A *kotaha* or whip sling in the Collection could have come from Cook Strait but the figure at the end is more likely to have been carved on the East Coast. Other items in the Collection are a group of plaited bags which correspond with North Island styles rather than being attributable to the northern South Island.

A unique item is a plaited cloak. The only records of plaiting being used for clothing in New Zealand are from finds in Central Otago now in the Otago Museum. A fragment of a cloak from Central Otago is half-hitched to a plaited fragment of diagonal plait made

from scraped flax but not scutched flax. This was obviously an inner garment of some sort. A similar piece was attached to a cloak decorated with parakeet skins laid on the warp threads, the single pair weft being taken across. The cloak also had a dogskin fringe. The plaited cloak was attached to the shoulder region (Hamilton 1892: 488). The cloak fragment in Otago Museum is also single pair twine. The Strath Taieri half hitch cloak (Simmons 1968: 9) also had a plaited piece with it. The row of half hitches along the top edge suggests that it was attached in the same way as the fragment above. The pieces in Otago Museum were compared with the Banks plaited cloak when both were in Otago Museum in 1966. Both were made from scraped flax and the techniques were very similar if not identical except for the fringing on the Banks cloak. Cave finds from the North Island in the Auckland Institute and Museum and in the National Museum have much plaited and woven work but nothing at all comparable to the Otago and Banks pieces. Therefore the Banks plaited cloak can be regarded as having a South Island origin.

Stockholm 1848.1.64. Plaited cloak/cape made of two strand rolled elements. There are four fringes, one at the top, one a third of the way down, one at the centre and one at the bottom. These fringes are scutched. The scraping of the leaf has softened the effect of the plaiting so the garment is not hard on the skin. Width 85 cm, depth 80 cm.

There is also a dogskin cloak i.e. a single pair twine cloak covered with strips of dogskin, in the Banks Collection. According to the account of Forster (Forster 1777, 1: 225) such were being worn by Te Ratu and his people from the North Island. The technology of some of the dogskin cloaks could suggest that this was not always the case.

Other First Voyage Collections

Lord Sandwich was one of Cook's patrons. After the First Voyage, a collection was given to Sandwich who presented some of it at least to Trinity College, Cambridge. This collection was in turn presented to the University Museum of Archaeology and Ethnology. The items in Cambridge may also include some Second Voyage material.

A similar collection was given by Sandwich on behalf of the Admiralty to the British Museum but cannot now be identified from Museum records but can be identified from drawings made for Banks, some of which were used for the official account of the First Voyage (Kaeppler 1978: 41).

Artefacts

Clothing

Cambridge D14.84. (Fig. 6). *Kaitaka* cloak. Single pair canvas weave. Down each side of the cloak a two ply plait of natural flax with fringes has been stitched on. The top hem has been finished by oversewing. The *taniko* base starts with a black and reddish braid for 1 cm. A similar strip is at the bottom edge of the taniko. The *taniko* itself is fine black and natural. A block of 38 cm of white (natural) wavy vertical lines, two to three lines to the centimetre, then a block of 67 cm of black with horizontal dots, a further block of 49 cm of vertical wavy lines. The wavy lines are like a very fine herringbone, the dots like a fine houndstooth pattern. Length 235 cm, depth 110 cm.

Fig. 6. *Cambridge D14.84*. Canvas weave cloak from First Voyage.

Cambridge D14.85. *Kaitaka* cloak. Double pair twine 0.5 mm apart with 4 extra wefts as shaping in the centre. The *taniko* at the base is narrow 4.3 cm wide and is all black except for alternate red and brown and black triangles at the top. Strips of dogskin (12 cm in length) with hair have been added to the outer corners of the *taniko*. Width 147 cm, depth 109 cm.

Cambridge D14.82. Rain cloak. Double pair twine weft with no shaping, 4.5 to 5 cm apart. The neckband is plaited and the sides finished with an extra plaited cord. The base hem is finished with two lines of single pair twine from each side. The thatch is roughly scutched mat flax. Width 100 cm, depth 76 cm.

The Sandwich collection includes a self coloured *korowai* D14.83 but this could also be a North Island piece.

Belts

The belts in the collection would appear to derive from different voyages. The original labels, now separate from the collections, are as follows.

"Matted belt no. 21 New Zealand", (on back) "45".
"Matted belt no. 20 New Zealand", (on back) "44"
"A Wove belt no. 25 New Zealand", (on back) "43 1775"
"Matted belt no. 16 New Zealand Gift of Capt. J. Cook 1775," (on back) "46".

Cambridge D14.48. A belt of closely woven double pair twine (No. 25 above?). I would pick this one as Bay of Islands despite the 1775 note on the back. Length 198 cm, width 12 cm.

Cambridge D14.47. A belt of plaited flax with six 5 mm braids plaited to make the tie. No pattern, folded and sewn together with blanket stitch at 4.5 cm intervals (No. 20 above?) Queen Charlotte area. Length 109 cm, width 9.2 cm.

Cambridge D14.46. A belt of plaited flax finished with a tie of double pair twine plaited string. Decorative brown string has been stitched horizontally to close the opening. No pattern. Probably northern South Island (No. 16 above?). Length 160 cm, width 9 cm.

Cambridge D14.45. A belt of plaited flax with ties held on by a band of double pair twine. East Coast form (No. 21 above?) Length 160 cm, width 9 cm.

Weapons

Cambridge D14.57. Patu paraoa. A whalebone *patu* with a definite handle area, butt with five ridges. Length 42.5 cm, width 8.5 cm.

Cambridge D14.59. Bone *wahaika*. A whalebone club of short billhook form with a knob on one side but no clear figure. Similar *patu* are known from Otago. Length 25.5 cm, blade width 7.2 cm.

Cambridge D14.56. Patu onewa with three ridges on the butt. The butt does not expand widely and has a squashed appearance. This may be the one on old labels "Patoo Patoo No.8 (No. 10) Gift of Capt. James Cook from New Zealand 1775" (i.e. Second Voyage). Length 32 cm, width of blade 9.5 cm.

Cambridge D14.61. Taiaha with long *pakati* on the eyebrows and mouth and two pair of spirals on the tongue. The spirals are formed by three ridges separated by two grooves *(haehae)* and square block *pakati* in Wanganui style. Length 184 cm, blade width 9 cm, head 22 cm.

Cambridge D14.63. Pouwhenua. A two handed club with a concentric circle on either side of the mid point with barred lines beneath this. Style Wanganui. Length 171 cm, blade width 12 cm, design from 55-66 cm from top.

There is another *pouwhenua* (D14.62) but the design is clearly Northland style.

Ornaments

Cambridge D14.38. Wood comb. A solid wood comb with twenty-two teeth. The top is curved with an inlet on the right side. In this is a manaia, the head projecting out past the edge of the comb, the mouth with lips on the edge of the inlet. A forked tongue goes forward and up to project above the head. The lips and tongue have a groove running along the centre. Length 9.5 cm, width 7.1 cm.

Musical instruments

Cambridge D14.55. Wood *koauau.* An open tube flute with three holes. A pair of lips is carved at the blowing end with small spiral and echoing lines, the open end of the flute is the mouth. The flute is decorated with two large and two small vulva patterns and some curved lines disposed in a fairly haphazard manner. All these are decorated with transverse lines between double lines in the manner of Wanganui style square block *pakati.* Length 10.5 cm, width 3 cm.

Cambridge 22.435. Pukaea trumpet. A long trumpet with head at the mouth end, bound with *akeake* vine for half the length. The mouth half of the trumpet is cord marked. Head is carved in the South Taranaki style with long brows sloping back wider than the mouth. This may have been collected on the Second Voyage. Length 179 cm, width 7.5 cm, mouth 1.4 cm.

There is another short *pukaea* (D22.436) in the collection decorated with North Auckland style carving.

Fishhooks

Cambridge D14.69 to 72. Four wood and bone hooks and sinker. These do not correspond with South Island types and appear to have been collected in the Coromandel area of the North Island.

Paddles

Cambridge D14.66 & 67. Carved and painted. These have *taratara a kai* notched decoration. If the old label is correct they were given to Sandwich in 1775 from the Second Voyage. They are of East Coast origin and may have been collected from Te Ratu and his group from Cape Terawhiti.

Object

Cambridge D14.65. One of the class of decorated ends with slots and holes for lashing to a plank, mask pointing up at the end. Probably the decorative end of a latrine bar used in tapu removing ceremonies. Carved in the style of Gisborne, Poverty Bay.

Ear pendant

Cambridge D14.39. Kapeu hooked greenstone pendant of North Island type.

Bone toggle

Cambridge D14.42. Albatross bone toggle. Not distinctive enough to be localised.

Aurei

Cambridge D14.44. Ivory cloak pin with cord. This conforms to North Island types.

Splint comb

Cambridge D14.44. A bound comb made from separate teeth. The decorative lashing looks North Island.

Adzes

Cambridge D14.50. Greenstone adze of quadrangular section. Length 5.4 cm, width 3.1 cm, thickness 8 cm.

Cambridge D14.49. Greenstone chisel of quadrangular section. Length 4.6 cm, width 4.4 cm, thickness 4.4 cm.

First Voyage Items Illustrated by Banks' Artists

Joseph Banks took with him on the Endeavour artists and scientific assistants. For New Zealand the artists who worked here were Sydney Parkinson a botanical illustrator who took over the role of artist after the death of Andrew Buchan and Herman Diedrich Spöring, a scientific assistant who also was an accomplished artist. Both of these were to die before the Endeavour returned home. After the return Banks employed James and John Frederick Miller, John Cleveley, and occasionally J.J. Barralet and J.M. Barralet and George Stubbs. These artists were engaged in making drawings of objects and natural history specimens collected on the First Voyage and in completing the work of the artists who had died on the voyage. Banks intended taking his company of artists on the Second Voyage but this did not happen. John Cleveley was to go on the Adventure while Joseph Miller and Benjamin Miller his brother were to go on the Resolution (McNab 1914, 2: 99-100). The material completed by Banks' artists can be safely attributed to the First Voyage collections made by Banks or Cook.

Artefacts

BM ADD MS 23920 f44. "New Zealanders Fishing" by Sidney Parkinson.

A wash drawing of two small fishing canoes and four large canoes in Queen Charlotte Sound. There are two canoes in the foreground with fishing canoe prows and sterns. In one canoe three figures are wearing black caps, one has a cloak tied on the breast, over and under the shoulders. The people appear to be two bearded men sitting with caps on, one man standing holding a paddle, one woman and one man with a topknot tending *hinaki* fish traps. The other canoe has at the front, a man with topknot, a figure with over/under cloak standing and one naked figure with belt. The paddles look like standard paddles with a carving at the junction of blade and handle. The larger canoes have rows of paddlers and high stern posts, standing figures holding *patu* and sitting figures. Two in the background have raised triangular sails and another sail appears in the distance. No carving is indicated on the sterns and no prows are visible. The large canoes look like war canoes. None of these items appear to have been collected.

Weapons

BM ADD MS 23920 f70. By J.F. Miller.

1. A *tewhatewha* with oblong blade with hole and ornament of hair at the bottom edge. Carving on the handle above the janus head. The carving is like that on the Sparrman *tewhatewha* in Stockholm collected on the Second Voyage. Carving style Wanganui. Not located in Museums.
2. A short spear with knob on the handle end, a *manaia* head with large eye and mouth with opening to the bottom. The nose or upper lip of the *manaia* is elongated as a point with three sets of paired barbs. Style Wanganui. Not located in Museums.

3. A *taiaha* with head carved in Taranaki - Wanganui style. Not located.
4. A spear with small figure below the point head to base, above this the point has five sets of paired barbs. This is identical to the spear in the British Museum No. NZ72. The figure is carved in the Wanganui style. Length 289 cm; length of figure 8 cm, barbed for 45 cm.
5. A variety of *hoeroa* with forked knob probably from the North Island.

BM ADD MS 15508 f24 and *BM ADD MS 23920 f68* which includes Plate 14 of the Hawkesworth edition of the First Voyage in 1773.

A *wahaika* club with two heads on the blade forehead to forehead along the concave side. Both heads have large rounded eyes and mouths with a pair of simplified arms beneath each head. The noses are made with parallel lines and grooves. There is a head on the end of the handle with curved brows, open mouth. The carving style is Wanganui. Length 38 cm.

This *patu* is in the Webster Collection in the National Museum, Wellington.

BM ADD MS 15508 f23. Patu onewa probably also depicted in *BM ADD MS 29320 f68.*

A *patu onewa* with expanded but squashed butt with four ridges. Length 40.4 cm, width 11.5 cm, thickness 2.0 cm.

This could be the *patu onewa* in the British Museum (NZ 80) which is very similar.

Ornaments

BM ADD MS 23920 f76. Lower drawing by J.F. Miller, 1771.

1. Splint comb probably in the Cambridge collections.
2. Bone comb with five teeth, curved top with flat ledge at side with knob attached at the bottom, probably North Island.
3. Wood comb with *manaia* at the side. This comb is Cambridge D14.38.
4. *Rei puta* of North Island style.

BM ADDS MS 23920 f69. ''Carving Knife from New Zealand'' signed Wm Cleveley Jun., 1774.

A *maripi tuatini* with *manaia* head at the front with large round eye. A large curve starts at the top of the eye and curves around to the small mouth where it has long fingers. The body of the *manaia,* starts at the lower part of this curve and sway backs to the beginning of the handle where there is a reversed C shape with an eye at the top. Between the body and top of the knife the area is filled with two swirls or base spirals. The teeth are five, set in a groove and lashed. A cord is attached to the back of the tooth bar. The handle has a perforation and cord and the eye area of a head. The carving is decorated with square block *pakati* or notches and long *pakati* in the Wanganui style. Length 22 cm.

This knife is now in the National Museum, Wellington; ME 2493 from Lord St Oswald.

Musical instruments

BM ADD MS 15508 f32b. Illustrated by Spöring (Lysaght 1979: 40).

Trumpet, large whelk mounted with carved mouth. Given by Banks to Thomas Pennant. Cambridge 25.374.

A triton shell with end cut off and replaced with a wooden mouth piece with hole at end. This had then been bound on. A large insert of resonant matai wood has been inserted in the shell, sewn and gummed. The mouthpiece is decorated with a janus head. The trumpet has a carrying cord attached to a mouth piece lashing made of twisted cord. The carrying cord is attached to the front of the shell. At the same place is attached a "keeper", a lemon-shaped ball made of plaited strips sewn together to make the ball. The carving is in South Taranaki style.

This is not the *putatara* illustrated in Cook (1777: Plate 19), formerly part of the Forster collection.

BM ADD MS 23920 f73 No. 2. By John Frederick Miller, 1771.

A *nguru* in wood decorated with vulva shapes and spirals with square block pakati in Wanganui style.This nguru is in the British Museum where it arrived in 1869 as part of the collection of Wm. Bragge Esq. of Sheffield (BM No. 5369).

THE MATERIAL CULTURE OF THE FIRST VOYAGE

Clothing

1. Double-pair twine cloak, no shaping.
2. Canvas weave (single-pair) cloak with black and natural *taniko* finished with braid, dogskin added.
3. Rain cloak, shaped or no shaping.
4. Plaited cloak.
5. Belts, little pattern, decorative brown cord.

Weapons

1. *Wahaika* "Wanganui" carving.
2. *Patu paraoa* with handle.
3. *Patu onewa* with squashed butt.
4. *Taiaha* "Wanganui" style.
5. *Pouwhenua* "Wanganui" style.
6. *Tewhatewha* "Taranaki" style.
7. Spear-barbed "Wanganui" carving.
8. Carving knife with "Wanganui" style carving.

Ornaments

1. Wood comb with *manaia*.
2. Black feather caps.

Musical instruments

1. *Koauau* "Wanganui" carving.
2. *Nguru* "Wanganui" style.
3. *Pukaea,* South Tranaki style (? Second Voyage).

Adzes

1. Greenstone quadrangular adze.
2. Greenstone chisel.

DISCUSSION

The artefacts considered here represent only those which can be reliably associated with a particular voyage. There are many others which can be documented as having been collected during Cook's Voyages but which have not been included. For example, I have considered twenty-one cloaks out of a total of forty which can be documented as having been collected during the voyages. Of these, fifteen have been selected which were collected at Queen Charlotte Sound or which correspond with others which were. Ten of these belong to the local area. In the Bellingshausen collections there are fifteen cloaks or parts of cloaks all collected in Queen Charlotte Sound.

Cloaks

The stability of the material culture of Queen Charlotte Sound is perhaps best exemplified by the technology of cloak weaving. The Second Voyage cloaks were made with either double-pair spaced twine, single-pair close twine (the canvas weave) or single-pair separated twine as in rough cloaks. The warp may include spaced brown and black lines in double-pair twine cloaks. The sides of the weft are finished with an extra brown cord and the ends of the warp may be cut off. Where the weaving is placed vertically, a brown and black braid may be used as a bottom hem. Braid is also used in *taniko* cloaks to finish or start the *taniko*. Shaping as inserts is often not present though it may be present as a broadening of the base to give a pyramid shape to the cloak. This is probably achieved by adding extra warp lines. *Taniko* is simple in design with brown and black triangles or plain black. Dogskin is used decoratively being added after the cloak is finished. The Third Voyage cloak in Berne corresponds with these criteria in having side braids and an extra brown cord at the upper hem even though the *taniko* style is Taranaki but with dogskin added. The 1820 collections repeat these criteria and add many more in that there are double-pair spaced twine cloaks often shaped in the weft — *korowai, pihepihe* tag cloaks and rain cloaks. Notable forms are the double-pair twine cloaks with black and brown striping in the weft, vertical weaving and *taniko* worked between the weft lines at the base. Black and brown braid is used as a hem. The most striking cloaks though are the close single-pair twine canvas weave cloaks with double *taniko* on three sides in the Taranaki manner; the body of the cloak is decorated with feather quillets (Fig. 1). These cloaks are technologically the same as the earlier cloaks but with a marked Taranaki influence in the *taniko* designs. This is not so evident in the other *kaitaka* cloak which has *taniko* at the base. An echo of the braid is seen in the black weaving along the sides. The design of this cloak is not Taranaki derived.

The First Voyage collections indicate the reverse in that there are cloaks in the collections which fulfill the criteria but do not show the Taranaki influence noted in later cloaks. Cloaks are double-pair twine with no weft shaping, or single-pair close twine, the canvas weave with self and black *taniko* and with brown and black braid at the top and bottom. The *taniko* is at the base of the cloak only. Rain or rough cloaks are single-pair twine with no weft shaping. The technique of attaching dogskin to the corners of cloaks is the same as that used to attach decorative strips of dogskin to the body of the cloak.

A remarkable cloak is the plaited cape in Stockholm (1848.1.64) which can be confidently identified as being of South Island origin when compared with items in Otago Museum.

The Banks cloak in Stockholm (1848.1.63) with its self and black ''Greek key'' *taniko* on a canvas weave base (Fig. 5), can be allied with the cloak in Cambridge (D14.84) with its canvas weave base with a self and black *taniko* in panels of vertical ''herringbone'' and horizontal ''houndstooth'' patterns (Fig. 6). There is one other cloak of this type which unfortunately has no provenance. It is in the Pitt-Rivers Museum Oxford and was found in ''Dr Pope's box'' (Fig. 7). This cloak is described by Roth (1923:95, fig. 75). It is a canvas weave cloak with broad *taniko* at the base. The body of the cloak is decorated with tufts of long dog hair, half-hitched into quillets. The ends of a number of quillets were plaited together as a bar which is then attached to the cloak by half-hitching. The quillet bars are attached in alternately spaced rows so that the body of the cloak shows through. Along the upper hem, strips of dogskin have been attached. The 33 cm deep *taniko* at the base has three rows of small black and brown, or black and self triangles. The pattern is in blocks as in the Cambridge cloak with a block of vertical chevrons (''herringbone'') for 17.8 cm, a plain black block for 14 cm, a large zigzag pattern which Ling Roth calls a ''squared meander'' (ibid) made with four lines of white natural horizontal going from the right, proceding a short distance vertically, then returning horizontally again, that is around three sides of a rectangle, then continuing vertically and repeating the three sides with the open side to the left etc. There are four of these making up one ''meander''. The space beside this is another ''meander''. At each side are two shortened versions. The meander panel measures 15.2 cm. Next is a vertical herringbone block for 18.4 cm in the centre, with a meander block with four rows for 16.5 cm, a plain black block for 14 cm and vertical herringbone for 17.8 cm. The plain black blocks are in fact not black but made of very fine black and self stitches in a finer version of the houndstooth pattern. The cloak is 122.5 cm at top, 126.5 cm at bottom and 103.5 cm deep at the centre.

These three *taniko* cloaks in Stockholm, Cambridge and Oxford are so similar in technique and design concept that I have no hesitation in identifying them as the work of a single and very gifted artist. These particular items are outstanding but there are other cloaks of a more mundane nature which are certainly the work of the same artist or somebody working closely with her. The cloaks were available on the First and Second Voyages.

The Vienna cloak (Vienna 25), which has a canvas weave body decorated with quillets of feathers pointing up, also has a *taniko* made with three rows of black and self, and black and brown triangles. It was probably part of the Leverian Museum collection

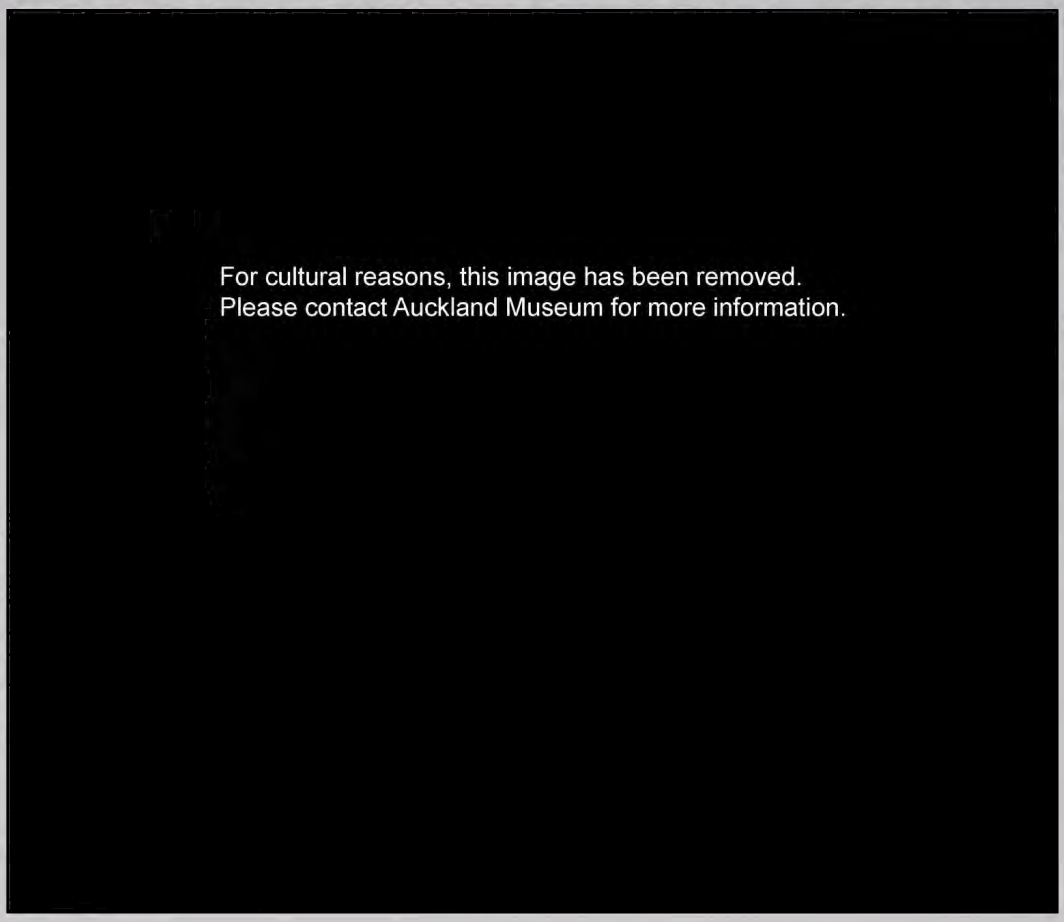


Fig. 7. Oxford "Dr. Popes's Box". Canvas weave cloak with dog hair and 'meander' pattern. Photo: Pitt Rivers Museum.

(Kaeppler 1978: 171) and could have been part of Cook's collection from the Third Voyage. This attribution, if it can ever be proved, would link a Cook Voyage piece with the Bellingshausen cloaks which also employ the same techniques. Samwell on his return from the Third Voyage sold his collection in June, 1781 (Kaeppler 1978: 47). One of the purchasers was John Hunter, brother of William Hunter, whose collection is now in the Hunterian Museum in the University of Glasgow. Among the reputed Cook items there are a number of cloaks, some of which are certainly from Queen Charlotte Sound.

Hunterian E352. Unfinished double-pair twine, 1.3 cm apart, plaited brown cord either side, top of warp cut off.

Hunterian E450. Single-pair twine, 6 mm apart. Vertical weft, top and bottom finished with dark and light brown braid, ends of weft cut off.

Hunterian E451. Unfinished single-pair twine 4 mm apart. Sides finished with extra brown cord. Shaped.

Hunterian E453. Unfinished canvas weave. Brown braided cord over and under in weft at top and sides. Two red *kaka* feathers caught in.

Hunterian E419. Kaitaka (old label "Specimen of matting from Sandwich Islands"). Double-pair weft 1 cm apart, sides finished with extra brown cord. *Taniko* top braided, base braided, rows of brown triangles at top and bottom. Depth 11 cm. The design is black and self, blocks of horizontal "houndstooth", self lines, chevrons in "damask" rows.

Hunterian E421. Kaitaka canvas weave, edges finished over extra cord. *Taniko* black except for two sets of tiny (1 cm) diagonal bars at 40-6 cm, 93-100 cm at the top. The top and bottom of the *taniko* are braided.

Hunterian E419/1. Vertical weft double-pair twine 1 cm apart with brown and black stripes, shaping. The two sides of the weft are cut off. The top is finished with a brown rolled cord, the base hem with a brown and natural braid. The two bottom corners are decorated with dogskin strips. The cloak is red from ochre.

Hunterian E421/1. Kaitaka canvas weave, top braided, sides taken around two extra cords with a braided black cord looping over and under along the edge. *Taniko* at base 6.5 cm deep. Design self and black triangles for 4 cm from top then plain black to base. "Taniko" is single-pair twine. (Ref. Forster cloak in Oxford).

Hunterian E422. Kaitaka plus feathers. Canvas weave. One side is taken around an extra cord, the other is finished with brown braid. The *taniko* at the base is 10 cm deep with a pattern of diamonds separated by chevrons. The design is similar to the Leningrad cloaks in being "Taranaki". The feathers of *kakapo, kiwi, pukeko,* gull are made into quillets and attached facing up as in the Vienna cloak. They are grouped together. Attachment is by sewing. Strips of dogskin are added to the sides of the cloak.

The cloaks in the Hunterian Museum cannot be documented by contemporary records as certain Cook collections. It is probable that they were. However, whether Cook Voyage or not, they indicate that the apparent lack of continuity between the First, Second and Third Voyages may not have existed in the items actually collected. The Bellingshausen collection cloaks, while exhibiting a much stronger Taranaki influence in the style and amount of *taniko,* nevertheless continue the technology of cloak making first noticed in 1770.

The Queen Charlotte Sound area is a trade nexus as indicated by the Second Voyage and the 1820 collections. It is possible that what we are defining as a Queen Charlotte tradition is either an earlier style which happened to survive until 1820 in Queen Charlotte Sound and before that was general in New Zealand or one which is shared with a wider area.

The surgeon Monkhouse writing in Poverty Bay in 1769 records three types of cloaks.

1. Open weave "fibres with cross threads twined run in parcels of 2 or three with an interval of four lines between them" (Beaglehole 1955:566).
2. "The second sort closely wove threads all appear to be twined (of these I observed but two)" (ibid: 572).
3. Thrumm mats made of a sort of sedge (ibid).

He notes that of the first sort "some of them had a very handsome border at the bottom about two inches and half broad, and worked in diamonds some half black, half white, others half black, half brown or cinnamon colour" (ibid: 572). Some of the second and third sorts "were lined at the lower corners with a bit of dogskin with the hair on" (ibid: 573).

At a later date at Anaura Bay he talks about cloaks, "One man dressed in an Ahou of the first sort ornamented with narrow stripes of white dogskin, sewed on in transverse rows, and a checquered border" (ibid: 583). The first sort of cloak was of open weave. Monkhouse had also seen a cloak off Portland Island which was bordered at the base with a more intricate checker pattern and a much broader border (ibid: 581). A feather cloak was seen at Anaura with the dogskin cloak. It was as Banks comments "covered almost intirely with small tufts of red feathers" (Beaglehole 1962, 1: 415). Monkhouse says the chief of Anaura was "dressed in an Ahou ornamented with birds' feathers, of the parrot kind as suppos'd, they are mostly red, and breast feathers" (Beaglehole 1955: 583). There were also the third sort of thrum mat dyed black as well as undyed (ibid: 583).

For the East Coast there are three kinds of cloaks.

1. Cloaks with separated wefts often with a *taniko* borker worked in diamonds. In one instance decorated with transverse strips of dogskin.
2. Closely woven with the threads all twined, sometimes decorated with strips of dogskin at the lower corners. These were rare.
3. Open weave with thrums of sedge.

At Cape Brett in Northland, Cook notes "two or three chiefs and the habits of these was rather superior to any we had yet seen, the cloth they were made of was of the best sort and cover'd on the outside with Dog skins put on in such a manner as to look agreeable enough to the Eye" (Beaglehole 1955: 213).

At the same time Pottier L'Horne of De Surville's expedition which stopped at Doubtless Bay in the Far North, noted "The plaiting is very tight and the length according to the use it is intended for, but between each row there is at least an inch interval. They leave long strings hanging outside to increase the heat. It is with a cloth like this that all the nobles and the old cover their loins." (McNab 1914, 2: 318 transl. by D.R.S).

After they had been to Queen Charlotte Sound, Banks wrote "The common dress . . . it is made of leaves of flag — which are split in 3 or 4 slips each . . . they have several kinds of cloth which is smooth and ingeniously enough work'd. They are chiefly of two sorts, one coarse as our coarsest canvas and ten times stronger but much like it in the lying of the threads. The other is form'd by many threads running lengthwise, and a few only crossing them which tie them together. This last sort is sometimes striped and always very pretty . . . to both of these they work borders of different colours something like Carpeting or girls Samplers in patterns with an ingenuity truly surprising." (Beaglehole 1962, 2: 14-15).

On the Second Voyage, Bayly the astronomer of the Adventure writes on 12 April 1773, "Their clothing consists of a mantle square but longer than wide . . . at the corners of which there is generally some pieces of dogskin sewed on with long white hair it in

general . . . (The) borders of black and yellow and some checquered all over and some all black and as close as European canvas, but it was few that had these they seemed to be chiefs.'' (McNab 1914, 2: 204).

On the Third Voyage, Edgar the sailing master wrote on 12 February 1777; ''Besides this coarse shag or thatch they have two kinds of cloth . . . the one is like coarse canvas, the other formed by many threads one way laying very close, and a few crossing the other so as to bind them together to both kinds of cloths borders of various kinds are work'd some have borders of Dog's skins, these they call Hahoo'' (McNab 1914, 2: 225).

The striped cloaks referred to by Banks are perhaps those of the East Coast which had ''two or three threads of black in the warp desposed at wide intervals'' (Beaglehole 1955: 572), but more than likely it refers to the striped cloaks of the South Island.

The items sent to the Admiralty by Cook from the First Voyage, later deposited in the British Museum, were listed in a letter to Secretary Stephens on 13 August 1771. They included ''1 chest of So. Seas Islands cloths, breast plates, and New Zeland cloths etc . . . a small carved box from New Zeland full of several small articles from the same place . . . 5 wooden, 3 bone, and 4 stone patta pattoos and 5 buga bugaes from New Zeland . . . 1 bundle of New Zeland weapons.'' (Beaglehole 1955: 638).

In the Cook collection in the British Museum there is a cloak (NZ 135) which may belong to the First Voyage.

BM NZ 135. (Fig. 8). Double-pair twine 8 mm apart worn with weaving vertical. There are three groups of brown stripes in the warp. The top hem is a braid of brown and natural. The base hem also is a brown and natural braid. At the left corner there are five rows of *taniko* worked between the weft lines forming a block 11.5 cm long. On the right side there are two black and one brown uncompleted rows of *taniko*. The end of the weft now at the right side has been cut off. There is one line of shaping at each side. A strip of dogskin has been caught into the upper right corner during manufacture. The cloak is 151.5 cm wide, 133 cm deep.

Of two cloaks in the National Museum in Ireland, one is an uncompleted cloak (No. 286) collected either by Dr Patten on the Second Voyage or Capt. King on the Third Voyage, it is identical in technique to NZ 135. The other is a later comparable cloak.

Dublin 286 Trinity College deposit. Double pair twine with vertical brown stripes and extra brown lines at the sides.

Dublin 545. 1911. A striped cloak ''Presented to Dr McKellar by John Towack alias Bloody Jack King of Roobooka New Zealand''. Towack was the paramount chief of Murihiku (Otago-Southland) Tuhawaiki who died in 1844. McKellar was the surgeon to the Sydney dispensary. This cloak is very like one in Canterbury Museum found in Dusky Sound. It is double-pair twine, no shaping with six groups of brown and black stripes in the warp. The ends of the warp have been cut off. The cloak is 340 cm wide, 140 cm deep.

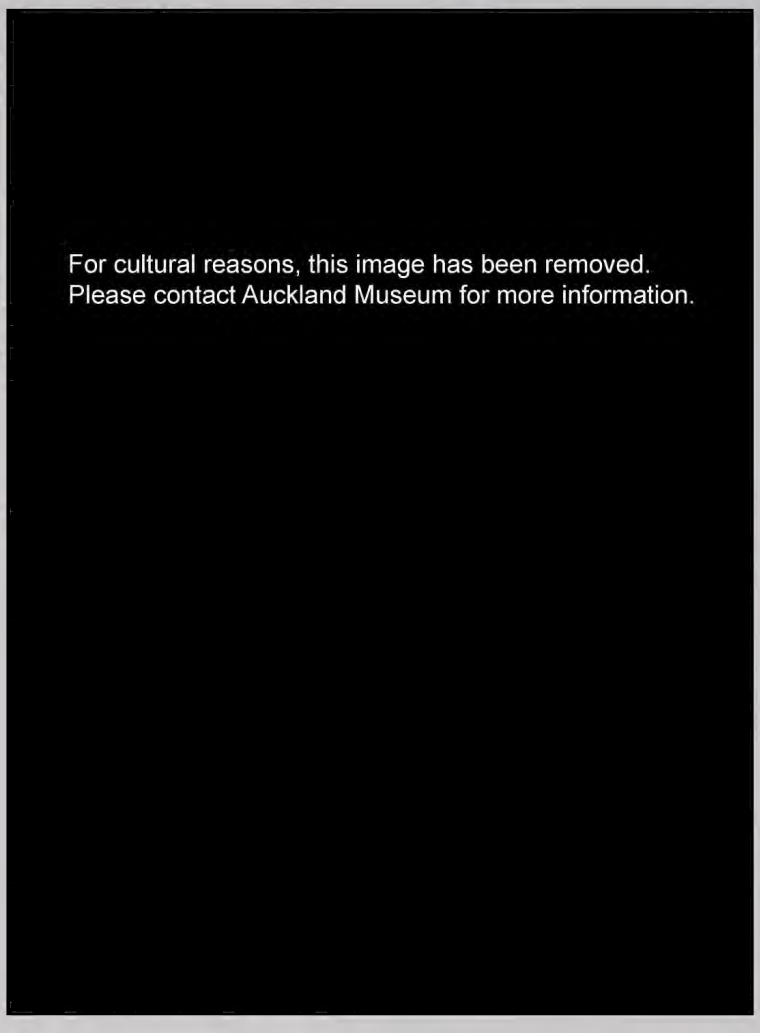


Fig. 8. *British Museum NZ135*. Detail of striped cloak. Cook Collection. Photo: British Museum.

In discussing the Leningrad cloaks it was noted that the black and brown striped cloaks were a particularly South Island form. These were probably present on the First Voyage and certainly present on the Second and probably the Third Voyages. They were still being made in 1820 and up to 1844. Like the canvas weave *kaitaka* cloak, the technology associated with them is remarkably stable over the whole period, even though as with the canvas *kaitaka*, external influence and culture change is seen in the changing fashions associated with the decorative *taniko* work. This can be seen clearly in a cloak in the Pitt-Rivers Museum, Oxford, which has the frustrating label, ''Probably collected by Captain Cook may be J.T. Bigge 1834''. John Thomas Bigge was a Commissioner appointed to enquire into the prevention of outrages in New Zealand. He visited New

South Wales in 1823 (McNab 1914, 1: 596) and may have visited the Bay of Islands. The cloak is not a provable Cook period item but stylistically bridges the gap between the known Cook Voyage pieces and the Bellingshausen collection and later South Island cloaks. It is as follows.

Ashmolean Museum 1135. (Fig. 9). A fine *aronui* cloak with vertical weft made with double pair twine 1.7 cm apart. The warp includes three blocks of black and brown stripes. The bottom hem is a black and brown braid 2 cm wide. The top hem is a rolled black and natural line. Shaping is provided on the left (7 interpolated lines) and right (7 lines). At the bottom left and right sides there are blocks of *taniko* 62 x 13.8 cm and 57 x 13.2 cm. Above this on each side is a narrow *taniko* strip forming the edge of the cloak. On each side these *taniko* include narrow strips of red worsted 1.6, 1, 7 and 1.9 cm long. The cloak is 183 cm wide at top, 167.3 cm wide at bottom and 122 cm high.

Fig. 9. *Oxford Ashmolean Museum 1135*. Striped cloak with braid base and "Taranaki" *taniko*.

The *taniko* pattern, in blocks at the side base, consists of three large triangles on a black ground with apex L,R,L. The bottom triangle is barred with three brown lines on a natural ground, a row of small brown triangles, three brown lines on a natural ground, a row of small brown triangles, three brown lines so that there are seven sets of lines and six sets of small triangles within the large triangle. The centre large triangle has a similar though different pattern. There are three of these, then the lines and triangles are placed at right angles. The third triangle repeats the first. The narrow *taniko* above has bars contain-

ing black and brown diamonds, then a small triangle point up, then bars sloping the opposite way, a triangle base up. This pattern is repeated for the whole length. This is a beautifully executed *taniko* of very pleasing though simple design. The block of *taniko* at the side base is a well known feature of later Taranaki weaving. The patterns are very similar to Taranaki forms.

This discussion so far has centred around the cloaks. They are the most numerous objects collected in terms of artefact classes and exhibit best the twin poles of stability and change or conservation versus innovation. Technologically they tend to be conservative, with only minor innovation in terms of designs.

Cloaks were and are the work of women artists and craftswomen and this factor could perhaps help to explain the conservatism. The other artefact classes though tend to be just as conservative and this may reflect the nature of the trading. Those objects which were available to be traded were those that were old, either redundant as surplus, outmoded or no longer used. Surplus could mean just that in a rich community, but it could also mean easily obtained through war and not valued. New items could be those made for trade either to other Maori tribes or for the Europeans. The desire for spike nails or hatchets was certainly a strong motive in Maori trade in Queen Charlotte Sound.

Weapons

The next most numerous class of artefacts collected were those associated with war. The weapons studied, from the voyages of Cook and Bellingshausen, are given in the following lists with brief style attribution.

Those weapons definitely attributed to the various Cook voyages and to the Bellingshausen visit are listed in Table 1.

Table 1. Weapons collected on the voyages of Cook and Bellingshausen.

1st Voyage	2nd Voyage		3rd Voyage	1820
	Queen Charlotte	N. South Island		
Wahaika "Wanganui"	*Wahaika* "Wanganui"	*Wahaika* "Taranaki"		
	Mere "irregular"			*Mere* "irregular"
Patu paraoa, handle	*Patu paraoa*, handle	*Patu paraoa*		
Patu onewa, "squashed"			*Patu onewa*	
Taiaha "Wanganui"	*Taiaha* "Taranaki"	*Taiaha* "S. Taranaki"		*Taiaha* "Gisborne"
Pouwhenua "Wanganui"		*Pouwhenua* "Taranaki"		
Barbed spear "Wanganui"		*Tewhatewha*		*Tewhatewha* "S. Taranaki"

Weapons collected during Cook's voyages without definite voyage attribution are as follows.

There are weapons from the Second or Third Voyage collections in Dublin which were collected in Queen Charlotte Sound.

TC.129.1884. Wahaika. "Wanganui".
TC.424,428 & 430.1884. Patu onewa. "Squashed".
TC.185.1884. Patu paraoa, handle.
TC.187.1884. Patu paraoa. "Otago".
TC.201.1884. Taiaha. "Taranaki".

In Vienna, the probable Third Voyage collection (ex Leverian Museum) includes some weapons (Moschner 1955).

15. *Wahiaka.* "Wanganui".
16. *Patu onewa,* thick.
13. Wood *patu,* handle.
17. *Taiaha.* "South Taranaki".

There are also the collections in Göttingen which were purchased from the dealer Humphrey in 1782 (Kaeppler 1978: 47), maybe from Samwell's collection made on the Third Voyage.

OZ225. Patu, wood handle.
OZ274. Kotiate. "West Coast."
OZ279. Patu onewa. "Squashed."
OZ276. Patu paraoa, long.
OZ281. Taiaha. "S. Taranaki."
OZ283. Tewhatewha. "Wanganui".
OZ284. Pouwhenua. "Cook Strait."
OZ1278. Barbed spear.
OZ1279. Tao spear.

If all these collections are taken together there is again a remarkable consistency in the items collected in that the range of weapons remains fairly consistent and the Wanganui style of carving is represented in all the Cook collections, but with the later voyages and the 1820 voyage including objects from outside the area. The East Coast and other North Island groups so well identified by the Forsters have in fact become a permanent element in the population but have not displaced the earlier cultural items represented by the weapons.

The presence of wood *patu* with definite handle areas in the 1782 collection from Göttingen and in Vienna also makes sense of the wood *patu* (NZ91) in the British Museum Cook Collection but without voyage provenance.

BM NZ 91. Patu rakau with a heavy blade of the same shape as a *kotiate* but without the sinus indentations at the side. The handle has a head carved on the end with big round

wood eyes and a prognathous jaw. The head is decorated in Wanganui style with lightly incised spirals and square block *pakati* notches. The club is 39.6 cm long, 13 cm wide and 2.5 cm thick.

The carving has some similarities to the *wahaika* in the Banks collection and to the *maripi tuatini* illustrated in BM ADD MS 23920 f69 now in the National Museum, Wellington. This club clearly belongs to Queen Charlotte Sound and may have been collected on the First Voyage.

Ornaments

With the addition of the ornaments attributed to Cook's and Bellingshausen's voyages and inclusion of the probable Cook's Third Voyage collections in Vienna and Göttingen, the picture becomes much clearer (Table 2).

Table 2. Ornaments collected on Cook's and Bellingshausen's voyages.

1st Voyage	2nd Voyage	3rd Voyage	1820	Vienna & Göttingen	
				GOZ292	Wood comb
Combs, wood with *manaia*				*V28*	Wood comb
				V267	Bone combs
	Ear pendant (irregular)		*Kuru*	*V20,21*	*Kapeu*
			Adze pendant	*GOZ294*	Ear pendant (irregular)
	Dentalium		Univalve	*GOZ295*	*Kapeu*
		Cloakpins		*V43,163*	Cloakpins
				GOZ299	Cloakpins
				V22	*Tiki*
				GOZ302	Toggle
				GOZ296	Teeth
				GOZ303	Birdskin

The distribution of these artefacts possibly does not represent a true distribution. However items in the collection, such as the wood combs with *manaia,* are represented from the First Voyage drawings and in the collections and while there are no examples in the certain Second and Third Voyages and the 1820 collections, they are represented in identical form in the Göttingen and Vienna collection which are probably Third Voyage. There is another comb in the probable Cook collection in Florence *(No. 158).* It is possible but unlikely that the Vienna and Göttingen collections in this case point out the possible gaps in the well-provenanced collections.

Other items

Another item collected on Cook's voyages was the *maripi* (or *mira*) *tuatini,* a shark tooth knife. One taken on the First Voyage is Wanganui style, one from the Second Voyage is Taranaki style.

There is also a shark tooth knife, in the British Museum Cook collection *(NZ 166)*, coloured red and black and very crudely made in the East Coast style. There is another in the Hunterian Museum which may be compared with those above. It is said to be Cook and possibly could have been from the Third Voyage (Kaeppler 1978: 43).

Hunterian E 352. (Fig. 10) *Maripi tuatini* with a *manaia* head at the front with a sway back body in which two *manaia* heads are connected by a chevron which is an arm and a leg. The body ends in a large eye with paua inserted. The five teeth are lashed in a groove. Decoration is by a combination of long and square block *pakati* and spirals in the Wanganui - South Taranaki style. The butt has a rounded form of an open spiral or the lips of a *manaia* with the top lip overlapping the bottom, one with the perforation, which has had paua in it, as the eye. Length of knife is 22.5 cm.

This knife is not provably Cook but corresponds very well with the other two items collected in Queen Charlotte Sound.

Musical instruments

These are listed in Table 3.

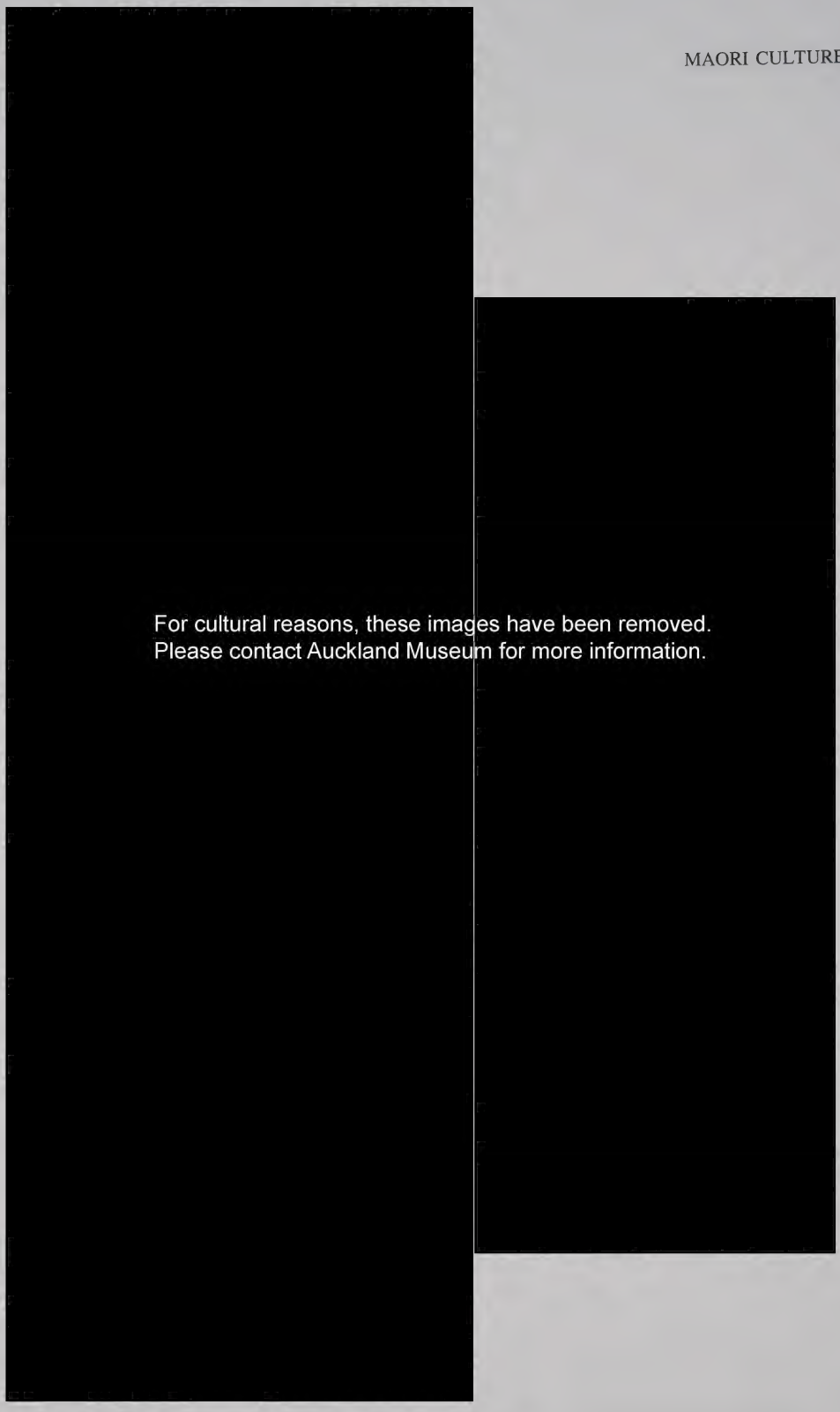
Table 3. Musical instruments collected on Cook's voyages.

1st Voyage	2nd Voyage	3rd Voyage	1820	Vienna & Göttingen
Koauau "Wanganui"				*GOZ324 Koauau* "Wanganui"
	Koauau (Otago)			*V29* Albatross (Otago)
Nguru "Wanganui"		*Nguru* (plain)		
	Putatara "S. Taranaki"			
Pukaea "S. Taranaki"				*GOZ325 Putorino* (E. Coast)

There are too few musical instruments to get a clear distribution. *Koauau* and *nguru* would seem to be indigenous while the other items are imported. The Wanganui style carving again appears local.

Carvings

In the Bellingshausen collection there are two *tekoteko* (Figs. 2,3). House carvings are non-existent in the well documented Cook collections. One *poupou* (wall panel) in East Coast style was drawn by J.F. Miller for Joseph Banks (MB ADD MS 23,920 f75) but cannot now be located even though it must have been drawn either from a pre-existing drawing by Parkinson or from an actual piece. The Bellingshausen carvings can be compared with two reputed Cook carvings in the Hunterian Museum, Glasgow.



Figs. 10, 11, 10. *Hunterian E352. Maripi tuatini.* 11. *Hunterian E329.* Figure.

Hunterian E 328 is a *tekoteko* with a peg base which appears to be female. It is of a figure with one hand to chest, one hand on the stomach with fairly long legs in proportion to the body. The head has a knob on the top and two very heavily worked flat eyes with heavy peg in the centre. The eyes are placed on the side of the head with four heavy square notches between the brows. The mouth is open with the tip of a tongue appearing. The mouth is heavily lipped with a dip in the top lip. At the back of the head from the shoulders, two swellings parallel the head. The figure is well formed with rounded shoulders and well made legs. There is no surface decoration. The *tekoteko* is 55.5 cm long, 7 cm wide.

The style of the figure is similar to the First Voyage double *putorino* depicted in BM ADD MS 23920 Fig. 72 and now in the National Museum, Wellington. The carving style is appropriate to the Southeast Coast of the North Island.

Hunterian E 329. (Fig. 11). *Tekoteko* or *poutokomanawa* figure (gable or post figure). A chunky figure with pod-shape body, heavy shoulders and short arms with well marked biceps on the right arm. The hands are on stomach, five fingers to each. Legs short. Sex male. The head is large with rounded forehead with two small uprights on top joined by a bar (to attach a wig). The ears are well modeled and the face beneath the eyes is a long triangular shape with inset planes for the eyes, a realistic nose, slightly raised lips and long chin. The head is about the length of the body excepting the legs. The figure is wearing a necklace of shark teeth. The figure has been painted white and later varnished; it is 49 cm long.

The style is related to that of the Bellingshausen figures. The sloping shoulders and big necks are absent but otherwise the style is within the Wanganui tradition. There is no surface decoration. The figure looks like an earlier version of that seen in the 1820's.

The first figure, E 328, compares with the *putorino* collected on the First Voyage which would appear to originate on the south East Coast of the North Island. The second figure, E 329, relates to the 1820 carvings and could suggest that Webber's drawing of a house with lintel on Motuara (BM ADD MS 17,277 f8 and 15,513 f6) was not an isolated occurrence in terms of house carvings.

Paddles and canoes

In 1820, Bellingshausen collected three types of paddles.

1. Flat with Taranaki carving.
2. Flat, painted, Gisborne carving.
3. Dished, hook, Wanganui carving (Fig. 4).

It has been shown that the third type was a South Island style and moreover while not included in the provenanced Cook collections, was present in the Leverian Museum collection pieces now in the British Museum.

1947 Oc4.1 (Figs. 12,13). Paddle. A dished paddle ending in a knob. On the back is a rib with sideways head at the end. On the lower part of the front is a figure with head to point. The paddle has been painted with red ochre. The length is 217 cm, blade width 19.3 cm and length of blade 120 cm.

Figs. 12-15. 12,13. *British Museum 1947. Oc4.1.* Detail of paddle. 12. Back. 13. Front. 14,15. *British Museum NZ152, NZ151.* Paddles. 14. *NZ152.* 15. *NZ151.*

There is a comparable piece in the National Museum of Ireland.

Dublin 1894.352. A dished paddle with hook, median ridge down the blade to a head mask carved in Wanganui style. The length is 196 cm.

There are also similar paddles in the British Museum collection NZ 151, 152 with no record.

BM NZ 152. (Fig. 14). This paddle has a dished blade with knob, ridge on the back (concave side) leading to a small mask upside down. The handle ends in a round knob. Painted red with white diamonds. The paddle is 203.9 cm long, the blade 124 cm long, 18 cm wide.

BM NZ 151. (Fig. 15). No record. A dished blade with ridge on back leading to the head of a figure in Wanganui style. The knob at the end of the blade is a *manaia* head. The length is 124.5 cm.

Both of these can be related to the Leverian Museum paddle (BM 1947. Oc 4.1) depicted by Sarah Stone in 1783 (see Force & Force 1968), described above. Another similar South Island paddle in the British Museum (1947. Oc 2.797) has a *manaia* in the same position as the figures just described.

Feather boxes

The feather boxes in the 1820 collections are all in styles more or less foreign to Queen Charlotte Sound. There is no record of earlier style boxes. There are only two in the documented Cook collections; these are in the British Museum.

BM NZ 109. Depicted in BM ADD MS 15508 f22 carved in the Bay of Islands style.

BM NZ 113. "Cook collection." Painted with patterns on the lid. The style of carving on

BM NZ 113. "Cook collection." Painted with patterns on the lid. The style of carving on the base of the box has spirals in each corner made with one groove and two ridges *(haehae),* one line of notches *(pakati)* and *haehae.* The box is divided lengthwise and transversely, then, from the lip, the lines run diagonally to the bottom then curl up on the front of the box. The spaces are filled with counter curving small spirals. The box has two crude heads as handles. The carving style is a Wanganui one. This box could be evidence for feather boxes in Queen Charlotte Sound if it can be proved to have been collected on the First Voyage. The only label is a note "Cook Collection" which may or may not be true. The dimensions of this feather box are length 59.6 cm, width 14.7 cm, depth 10.6 cm.

Fishhooks

Lack of well provenanced specimens is a constant drawback to the study of material culture. The collections studied have not included any fishing gear which is sufficiently distinctive to be recognized as belonging to Queen Charlotte Sound. The Göttingen collection includes 16 fishhooks purchased in 1782; only 14 were seen.

OZ377. A barracouta lure — a wood shank with bone point inserted of South Island type.
OZ327, 328, 329 double inner barb hooks of East Coast - Canterbury type. The lengths are 3.6 cm, 3 cm and 3 cm.
OZ355. A bridled minnow lure of whalebone with whalebone point known from the East Coast.
OZ 338. Wood and bone composite bait hook with heavy shank joined at bottom to footed tripled barbed point. It is 14 cm long.
OZ339, 340, 341, 342, 331, 332. Six wood and bone composite hooks.
OZ336. One wood and wood composite hook.
OZ330. One Cook's Turban shell one piece hook.

These hooks indicate the range of material which must have been collected but which cannot now be identified in the museum collections.

CONCLUSION

Queen Charlotte Sound was a natural gateway to the South Island and, in the reverse direction, to the North Island. For at least six hundred years the area was a nexus for trade in baked argillite rock from the D'Urville - Nelson mineral belt and in nephrite from the West Coast. A local group who control a resource or its distribution are in a favoured position so long as it maintains control but it is also at the mercy of takeovers by others seeking the same advantages.

One can speculate on the techniques developed by the local people of Queen Charlotte Sound to lessen the impact of imported culture change. Warfare against invaders must have been necessary at times but the population could never have been great enough to have sustained such an effort over long periods. The material culture of the 18th century indicates that there were marked influences affecting the local people but somehow the foreign elements were absorbed and, in a fairly short period, became part of the local culture. The introduction of Taranaki style *taniko* patterns is a good example. The basic and very local technology of cloak-making was not submerged — only the decorative *taniko* element was affected by the North Island imports. This is despite the fact that the North Island technology for producing *kaitaka* cloaks is less demanding in time and produces an equally handsome garment.

The Bellingshausen collection of 1820 illustrates the vigour of the local culture which had been able to survive the influx of people from other areas, adopt a new economic base — potato agriculture, but retain a material culture little changed from Cook's first visit in 1770. That there was a strong local culture or cultural form is one aspect which has emerged from this paper. This has enabled the identification of a number of 'possible' Cook period cloaks as being certainly from the Queen Charlotte Sound area. The weapons are not as clearly defined but nevertheless show the same local culture as the cloaks. The presence of weapons from the North Island in the later collections does not affect the range of weapons produced locally. The other material culture items which were collected on the voyages follow the same scheme with the local culture re-emerging.

The identification of the elements of the local culture has also allowed us to project back and suggest that items such as the South Island dished paddles, present in 1820, were also present in the area in the 18th century, even though the only examples available are,

at best, 'probable' Cook pieces without voyage provenance. The carvings in the Hunterian Museum were also able to be attributed to the area. These are the only house carvings which probably belong to the Cook period.

Well provenanced collections have been used to establish the characteristics of the local material culture, then the scope was broadened to include other collections and later items which have the same characteristics.

Judging by the collections made over fifty years in Queen Charlotte Sound, it is considered that the material culture of the area was remarkably stable despite incursions from outside groups.

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REFERENCES

BARRATT, G
1979 *Bellingshausen A visit to New Zealand: 1820*. Dunmore Press, Palmerston North.

BEAGLEHOLE, J.C. (Editor)
1955 *The Journals of Captain Cook*. Vol. I. The voyage of the Endeavour 1768-1771. Cambridge University Press for Hakluyt Society, Cambridge.
1961 *The Journals of Captain Cook*. Vol. II. The voyage of the Resolution and the Adventure 1771-1775. Cambridge University Press for Hakluyt Society, Cambridge.
1962 *The Endeavour Journal of Joseph Banks*. 2 vols. Trustees of Public Library of N.S.W. and Angus & Robertson, Sydney.
1967 *The Journals of Captain Cook*. Vol. III. The voyage of the Resolution and Discovery 1776-1780. Parts One and Two. Cambridge University Press for Hakluyt Society, Cambridge.

COOK, J.
1777 *A voyage towards the South Pole and Round the World. Performed in His Majesty's ships the Resolution and Adventure in the years 1772, 1773, 1774 and 1775*. Printed for W. Strahan and T. Cadell, London.

FORCE, R.W., and Maryanne FORCE
1968 *The Art and Artefacts of the 18th Century:* Objects in the Leverian Museum as painted by Sarah Stone. Bishop Museum Press, Honolulu.

FORSTER, G.
1777 *A Voyage Around the World in His Brittanic Majesty's Sloop Resolution Commanded by Captain James Cook*. 2 vols. B. White, J. Robson, P. Elmsly, G. Robinson, London.

GATHERCOLE, P.
n.d. ''From Islands of the South Seas 1773-4''. Exhibition Catalogue. Pitt-Rivers Museum, Oxford.

GERMER, E.
1975 *Zu Georg Forsters Polynesian - Sammlung von Wörlitz in Fiedler H. Scheibe S. and Germer E. Georg Forster Naturforscher, Weltreisender. Humanist und Revolutionar*. Staatlich Schlosser and Güarten. Wörlitz. pp. 61-92.

HAMILTON, A.
1892 Notes on old flax mats found in Otago. *Trans. N.Z. Inst.* 25: 486-488.

KAEPPLER, Adrienne
1978 *''Artificial Curiosities''* An exposition of Native Manufactures. Collected on the Three Voyages of Captain James Cook. Bishop Museum, Honolulu.

LYSAGHT, A.
1979 Banks Artists and His Endeavour Collection. *British Museum Yearbook* 3: 9-80.

MCNAB, R.
1914 *Historical Records of New Zealand*. Vol.2. Government Printer, Wellington.

MEAD, S.M.
1969 *Traditional Maori Clothing*. A.H. & A.W. Reed, Wellington.

MOSCHNER, Irmgard
1955 Die Wiener Cook - Sammlung, Südsee - Teil. *Archiv Für Völkerkunde* Band X: 126-253.

PARKINSON, S.
1784 *A Journal of a Voyage to the South Seas in H.M.S. Endeavour*. Richardson, London.

ROTH, H. LING
1923 *The Maori Mantle*. Bankfield Museum, Halifax.

RYDEN, S.
1965 The Banks Collection. An episode in Anglo-Swedish Relations. *Ethnograph. Mus Sweden Mon. Ser. Publ.* 8: 1-121.

SHORTLAND, E.
1851 *The Southern Districts of New Zealand*. Longman, Brown, Green & Longman, London.

SIMMONS, D.R.
1968 The Lake Hauroko Burial and the Evolution of Maori Clothing. *Rec. Otago Mus. Anthrop*. 5: 1-40.

SKINNER, H.D.
1924 Archaeology of Canterbury 11. Monk's Cave. *Rec. Canterbury Mus*. 2: 151-159.
1974 *Comparatively Speaking*. University of Otago Press, Dunedin.

SMITH, S.P.
1910 *Maori Wars of the Nineteenth Century*. (2nd Ed.). Whitcombe & Tombs, Christchurch.

SODERSTROM, J.
1939 A. Sparrman's Collection from James Cook's 2nd Expedition (1772-1775). *Ethnograph. Mus. Sweden New Ser. Publ.* 6:1-70.

EXCAVATIONS AT OUE PA, N43/35, SOUTH AUCKLAND

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Abstract. In the early 1950s Mr V.F. Fisher and students of Ardmore Teachers College excavated a headland pa, N43/35. The pa was found to have been occupied in the late prehistoric and protohistoric periods. The results of the excavation are discussed and the artefact assemblage compared with that from the important Classic Maori site of Oruarangi.

Oue Pa is situated approximately two kilometres northwest of the Wairoa River mouth, South Auckland (Fig. 1). Located on a small headland and surrounded on three sides by mudflats, low-lying land and swamps, it is well placed for defence, food gathering and other economic activities.

The pa has an outer transverse ditch and bank along its southern boundary and an inner ditch and bank system running parallel to and 110 m from the outer ditch. The inner ditch and bank system lies immediately south of a *tihi* stronghold and effectively divides the pa into two areas. These two areas — southern and northern — are rather different in their physical characteristics and will be described separately.

Southern area. With the exception of the upper area adjacent to the outer ditch (Fig. 2), the steep slopes of the eastern side are unmodified. The western side with its gentle slopes, however, is extensively terraced. These terraces vary markedly in their size and shape. A causeway or breach in the outer ditch at the highest point is probably of recent origin.

The most striking feature of the southern area and indeed the pa as a whole is the presence of three large midden mounds which are located outside the defences (Fig. 2). Of the two middens south of the outer ditch the upper one, situated by the causeway, is 45 x 13 m and 1.5 m in height. A second midden, 20 m down the western slope is 15 x 20 m and 2.0 m in height. Opposite to this, on the northern side of the ditch lies a smaller area of scattered midden. The size of the third midden mound, which is located inside the ditch but towards the bottom of the terraced slopes of the western side of the pa, is difficult to determine today; its size when excavated in 1951 will be discussed later in this paper.

In addition to the midden mounds, fragmentary midden is sparsely scattered over much of the pa. Indeed, rabbit hole excavations on both the western and eastern sides of the pa suggest that there are further areas of concentrated midden deposits not visible from a surface examination of the site.

Northern area. This area has been extensively modified in the past few decades by the construction of a road to the top of the pa and by the quarrying of the northern face. The most prominent feature is the *tihi,* approximately 1200 sq m in area. Situated on the

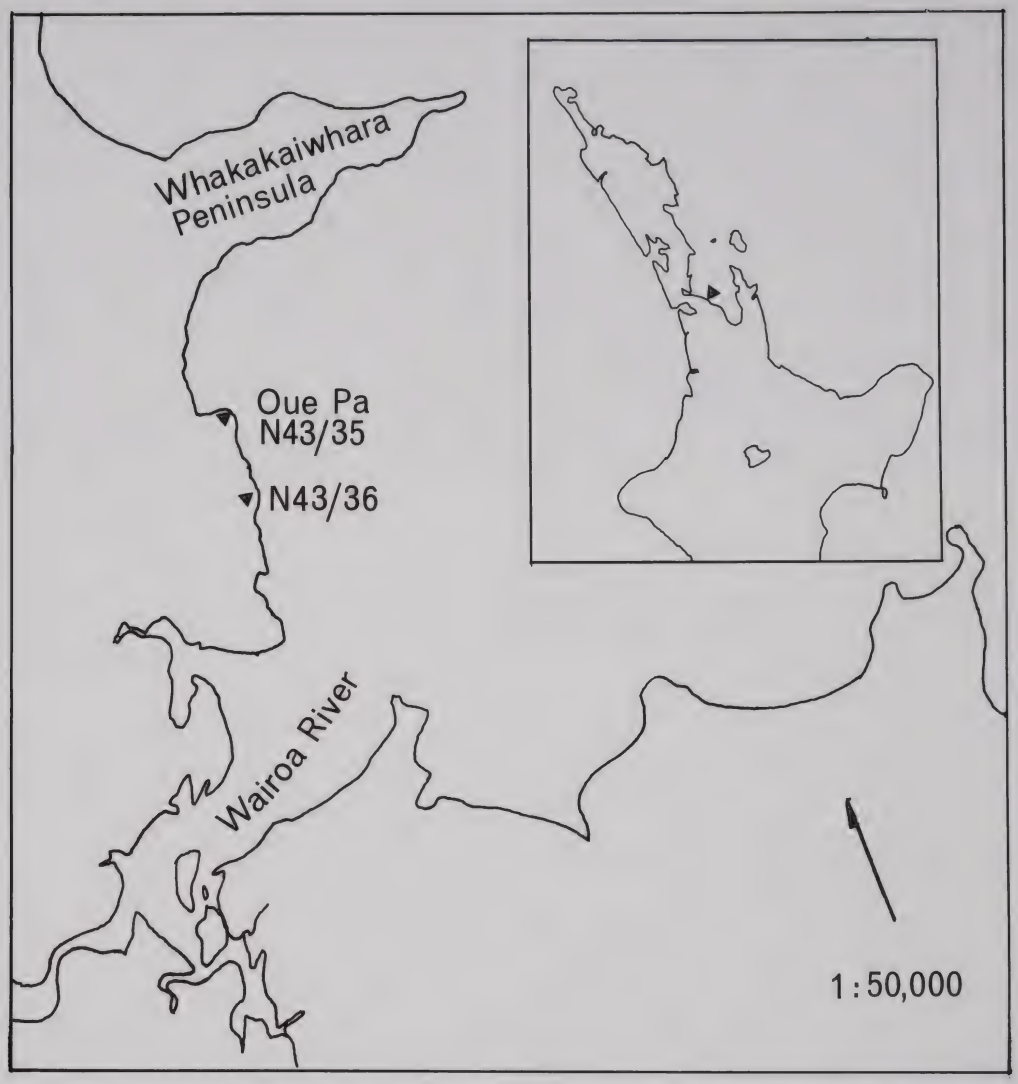


Fig. 1. Location map of Oue Pa, N43/35.

highest point, the *tihi* affords an excellent view of the terraced slopes of the entire pa and the surrounding area. Photographs of this part of the pa, taken prior to its modification, show that the steep slopes on all but the south side were terraced on their upper reaches only. A 10 m high scarp to the double ditch and bank below lie to the south of the *tihi*.

A palisade line of post-holes cut into the rock of the estuary approximately 20 m from the present northeast base of the pa has been reported (Tonson 1966:177, Abercrombe MS.) and is shown in photographs taken in the early 1950s. Why such a laboriously constructed palisade was necessary is difficult to determine but may have been related to

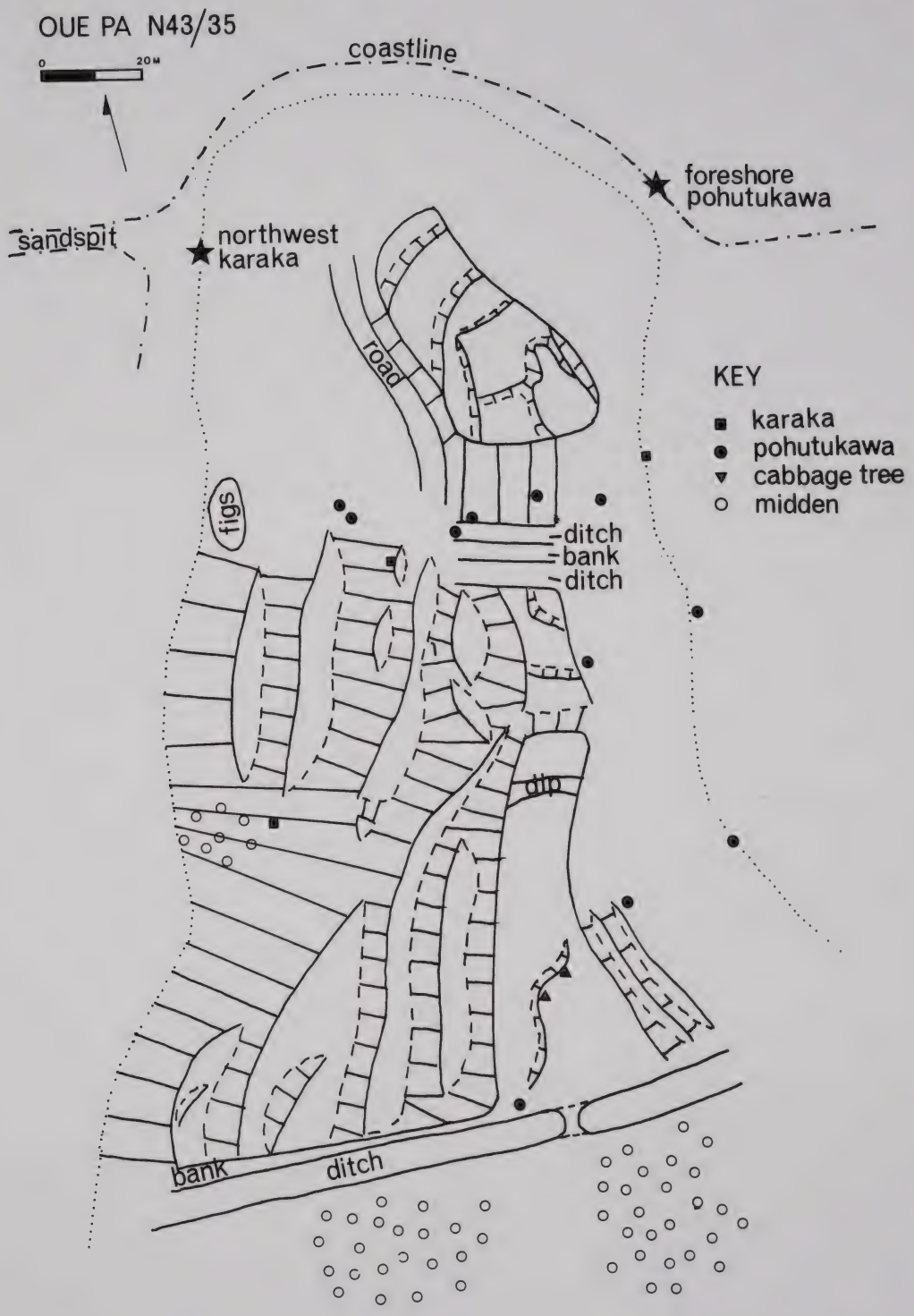


Fig. 2. Plan of Oue Pa, N43/35.

the fact that the lower slopes of the north face were unterraced. Alternatively, the post-holes may have supported some kind of structure other than a palisade or may be European in origin. I was unable to locate them during a recent visit to the site, possibly because the sand and mud, which have filled the many natural holes in the rock, have obscured them.

HISTORY OF INVESTIGATIONS

Oue Pa was the subject of intensive fieldwork in the early 1950s by the history students of Ardmore Teachers College under the overall supervision of Mr V.F. Fisher, then Ethnologist at the Auckland Museum. The artefacts found are held in the Museum and all artefact numbers given in this report are Auckland Museum numbers. Excavations were conducted over four field seasons from 1950 to 1953. Although full and precise data on these excavations is not available, student projects written during the 1951 investigations and some fieldnotes kept by Mr Fisher and the staff of Ardmore College in 1952 and 1953 as well as a series of photographs taken during the fieldwork, allow an overall reconstruction of the investigations and an assessment of the occupation of the site to be made.

It has not been possible to determine all the areas excavated during the four years. No information at all is available on the first field season and notes for 1953 are limited to three diagrams of gridded areas and a brief statement of artefacts found. Since it is known that the areas excavated in the preceding years were extensive it is probable that a larger area was opened than that indicated in the 1953 notes. A small amount of shell held at the Auckland Museum marked "Oue Pa midden 1953" suggests that this could be the case although the shell may have been surface collected.

In many instances the exact location of the area excavated is not known. In general these areas are referred to in the fieldnotes by distance from trees although occasionally a direction is given. Where these trees are still standing it has been possible to define with some certainty the precise location of the excavated plot. In other instances, however, excavated plots are referred to in relation to each other or to positions of transient objects and consequently only a general location can be determined.

EXCAVATION METHODOLOGY

The aims of the 1952 field season at Oue Pa were to investigate the topics of Maori occupancy in the Hauraki Gulf, the Transitional (Protohistoric) Maori period and Maori Food according to the Ardmore College Course Outline for 1952. Areas around the base of the pa were excavated, particularly at the northern end where a post-European settlement was reputed to be, and a midden was investigated. Although no course outline is available for the previous years, it seems that the students in 1951 were working on similar topics since the areas excavated were also concentrated around the base of the pa and several middens were investigated. The areas known to have been excavated in 1953 are all located either on top or at the southern end of the pa indicating that the emphasis previously placed on the protohistoric period and the economy of the occupants had been replaced by a more intensive investigation of the pre-European history of the site.

All measurements taken during the fieldwork were in feet and inches. These have been converted into metric measurements throughout this report. Where appropriate, both are given.

In 1951 trench excavations were conducted with middens being excavated in 30.5 cm (12 inch) spits and other areas in 15.2 cm (6 inch) spits. Some attempt was made to record the stratigraphy encountered and to note the spit or layer from which artefacts were recovered. In subsequent fieldwork, however, this system was abandoned and a method of excavating gridded squares (without baulks) was adopted. The plots excavated were divided into a series of *ca.* 0.9 x 0.9 m (3 x 3 ft) squares and each square was systematically assigned a grid number according to its placement in the plot. Records were kept of the grid number and depth of important artefacts found. A similar excavation strategy was used in the later excavations by Ardmore College students at Ponui Island (Nichols 1964).

THE EXCAVATED AREAS

The areas excavated at Oue Pa have been divided into four groups — middens, swamps, areas around the base of the pa and areas on top of the pa. These will be described in turn below. Fig. 3 shows the locations of the areas excavated.

It is estimated that total minimum areas excavated were: middens, 21.7 sq m; swamps, 63.5 sq m; around the base of the pa, 118.7 sq m; and on the top of the pa, 46.8 sq m.

Middens

In 1951, three were examined. The first (M1) was on the western slope of the pa, below the terraces. It measured 15.2 x 9.1 m. An 0.9 m wide trench was excavated in it by 30.5 cm spits to a depth of 1.5 m (Sharplin MS.). This midden received further attention in 1952 when a trench 2.7 m in length and 1.2 m in width was excavated. A photograph (Fig. 4) shows that this trench was adjacent to and north of the 1951 excavation.

Another trench was dug through the centre of the midden by the causeway (M2) and a further trench around the edge of this midden. The third midden examined in 1951 was one stated as extending from the summit of the pa to the base on the eastern side (M3). Here a trench was dug from the centre of the midden directly back into the hill (Sharplin MS.). Although not stated in the reports it is probable that the size of the trenches excavated in these latter two middens were the same as the first midden investigated and that these middens were also excavated in 30.5 cm spits.

Swamp excavations

Farming practices in the past three decades have changed the extent of swampland around Oue Pa. The coastal strip immediately behind the beach on the eastern side of the pa which is today fertile farmland was previously swampy while the swampland around the creek along the western side of the pa was formerly more extensive.

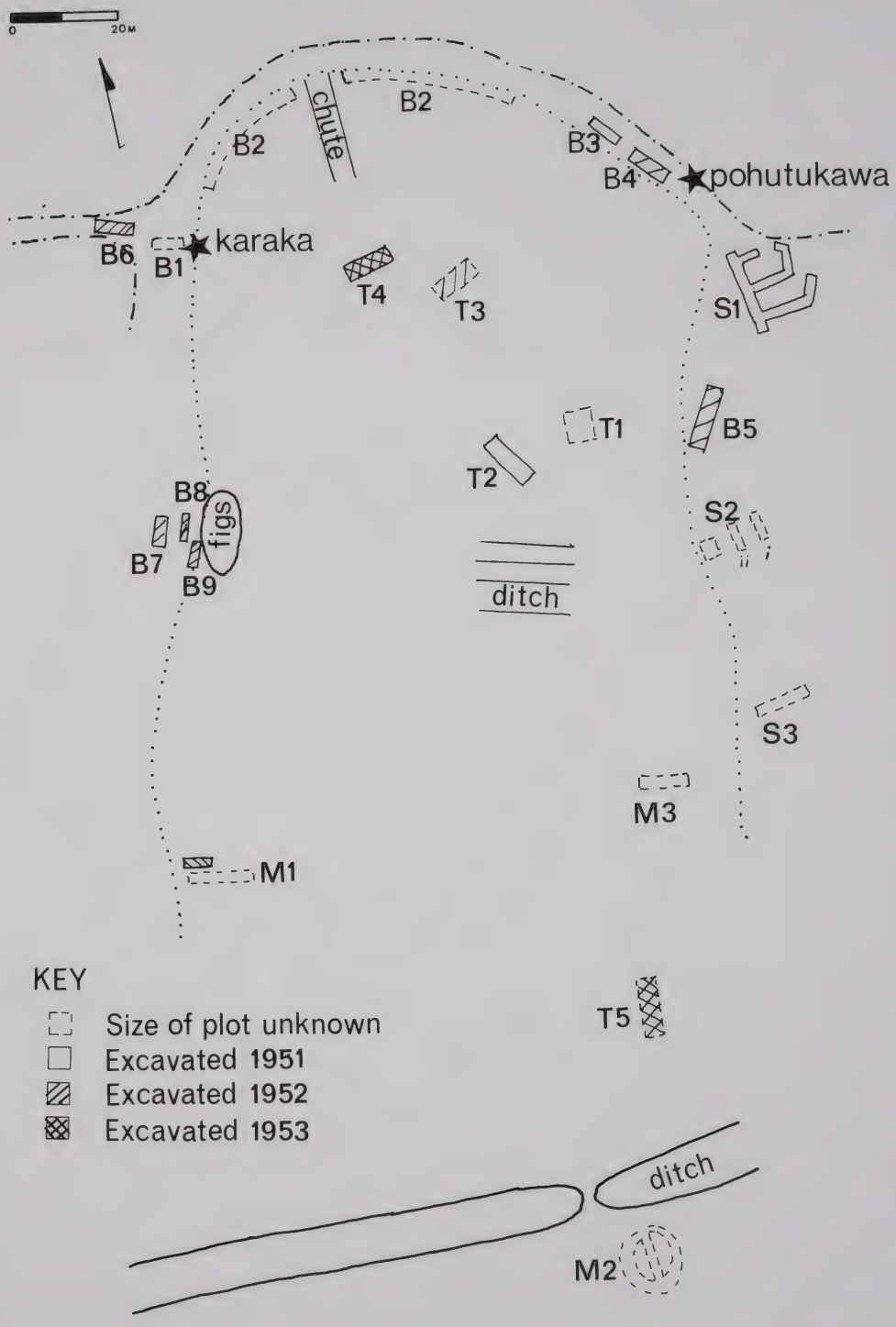


Fig. 3. Plan of areas excavated, 1951-1953.

Fig. 4. The 1952 excavation of Midden M1, with spoil heap from the 1951 excavation on the left.

In 1951, swamp excavations were carried out in the eastern swamp areas. The first (S1) was near the foreshore pohutukawa tree *(Metrosideros excelsa)* (see Figs. 2,3). A trench was dug from near this pohutukawa to another tree, probably standing to the south. This trench was 15.2 m long with subtrenches being dug on the eastern side. The first subtrench was placed 1.8 m from the northern baulk and a further two subtrenches were dug at 4.6 m intervals. Presumably because the subtrenches proved worthy of further exploration these were extended (Fig. 3). At least one subtrench was 0.9 m wide and all were dug to a depth of at least 45.8 cm.

A further two swamps were examined in 1951. From the very meagre sketch plan available it would seem that both of these swamps were situated closer to the base of the pa but since no traces of these swamps remain in this area today, it is not possible to substantiate this without subsurface investigation. It is possible, therefore, that these two areas examined were located considerably further to the southeast of the pa where two small swamps are present today. Two trenches were placed across the oblong swamp (S2) and a further area at the southern end was excavated as well. The position of the trenches and their distance apart is not known. Only one trench was placed across the final swamp excavated (S3). The size of the trench is not known.

Base of the pa

In 1951, a trial trench was put through a so-called *whare* site (B1) under the karaka tree (*Corynocarpus laevigatus)* on the northwest side of the pa (Figs. 2,5). Photographic evidence (Fig. 6) indicates that either this area was extended in 1951 or another site near

Fig. 5. Opening excavation B1, near the karaka tree. Excavation B2 and the metal chute to the left.

Fig. 6. Extension of excavation B1, in 1951.

the karaka was also excavated. The size of these trenches are unknown although it is likely that the trial trench was of the same width as the midden excavations (0.9 m).

The small bank (B2) around the northern base of the pa was examined in 1951 as well. This was excavated by loosening the soil a metre from the exposed bank and forking through the loosened soil (J. McKinlay pers. comm.). The size of the excavated area is not known although photographs (Figs. 5, 7) indicate that both sides of the metal chute, present on the northwest side of the pa in the 1950s, were examined.

An area (B3) stated to be 10.7 x 10.9 m (but since it was divided into seven grids possibly 10.7 x 0.9 m) at an unspecified distance northwest of the foreshore pohutukawa was excavated in 1951. In the following year a plot (B4) 10.9 m west of the same pohutukawa was investigated. It measured 8.2 x 3.6 m (9 x 4 grids).

Area B5 was also excavated in 1952. This plot measured 10.8 x 2.7 m (12 x 3 grids) and was located 9.4 m from the karaka tree on the southeast side of the pa. The direction of the excavation from the tree is not known. If north, which I think is more likely, it was located between the swamp excavations S1 and S2.

Fig. 7. Excavation B2, west of the metal chute.

An excavation (B6) located on the sandspit, 17.3 m from the northwest karaka tree, was opened in 1952. It was initially 5.2 x 0.7 m in size but was later widened to between 1.5 m and 2.1 m.

A further area examined in that year was B7, 25.3 m west of the fig trees (Fig. 3). A square 2.1 x 2.1 m (2 x 2 grids) was opened and this was increased during excavation to 4.6 x 2.1 m.

Eighteen metres to the east of this plot, B8, measuring 6.1 x 1.2 m, was also excavated. Closer to the fig trees an area (B9) measuring 4.9 x 0.9 m was investigated. Both B8 and B9 were examined in 1952.

A train trench (B10) "in the bank of shell bordering the swamp and six feet (1.8 m) from the edge of the swamp" (Abercrombe MS.) was excavated in 1951. It was dug to a depth of 15.2 cm at the swamp end and 30.5 cm at the other end. Photographs suggest that this plot was situated on the western side of the pa, south of the sandspit.

A further trench (B11) "dug from the drainage ditch of the men's cooking tent" in 1953 cannot be placed with any accuracy at all, but may have been on the western side of the pa.

Top of the pa

Another so-called *whare* site (T1) on or near the *tihi* was examined in 1951. No further information is available about this excavation.

An area (T2) measuring 10.9 x 0.9 m and located on the northwest slopes by a pathway between the "large pohutukawa and the quarry" was investigated in 1953. Its exact location and relationship to the previous excavations in the immediate area are unknown.

An area (T3) excavated in 1951 is referred to as the "bank near quarry" (Abercrombe MS.). Its location, therefore is most likely to be on the north or northwest slopes of the pa. The dimensions of the excavation are unknown.

A terrace on the northwest slope was also investigated in 1952 when an area (T4), initially measuring 7.0 x 3.0 m but later extended to 8.2 x 3.6 m (9 x 4 grids), situated near the top of the metal chute was excavated.

The only other area on top of the pa known to have been excavated is a terrace on the seaward side of the pa (T5). The extent of this excavation, conducted in 1953, is unknown.

EXCAVATION RESULTS

Middens

M1. Three layers were identified in the 1.5 m deep trench. The first is recorded as being 30.5 cm in depth. It consisted of the turf layer with fragmentary shell and the underlying concentrated shell deposits with ash, charcoal and oven stones. Shellfish recorded at

present are as follows: cockle *(Chione stutchbuyrii)* which made up approximately 98% of the deposits, mussel *(Mytilis edulis* and *Perna canaliculus)*, pipi *(Paphies australe)*, tuatua *(P. subtriangulatum)*, mud snails *(Amphibola crenata)*, ringed dosinia *(Dosinia anus)*, whelks *(Austrosipho adusta* and *Comminella adspersa)* and oysters and scallops (species unknown). Fish bone and a stingray palate were also found.

The next layer, 30.5-91 cm below the surface was similar to, and contiguous with, the first layer. Shell deposits and ash were more concentrated and although oyster and mussel were more common the same shellfish were present. The jaw bone of either a snapper or a hapuka was found as well as a pig tooth. The basal layer was separated from the layer above by a "blackish earth". Scallops were more plentiful in this layer and ash tended to be concentrated in patches.

A section drawing (reproduced in Fig. 8) was made of the trench. It can be seen from this that the layers were more apparent than real.

The fieldnotes for the adjacent 1952 excavation do not record the presence of shell in the midden. A dog jaw and tooth, a pig tusk and a stingray palate were found 23-61 cm deep.

M2. The shellfish present in this midden are recorded as having been the same as those in M1. Scallops were more commonly found and fish bone and oyster less. Cockle comprised 99% of the deposits. An adze, found 22.8-30.5 cm in depth, is described as "flaked with a smooth edge" (Abercrombe MS). Unfortunately it is not in the Auckland Museum collections.

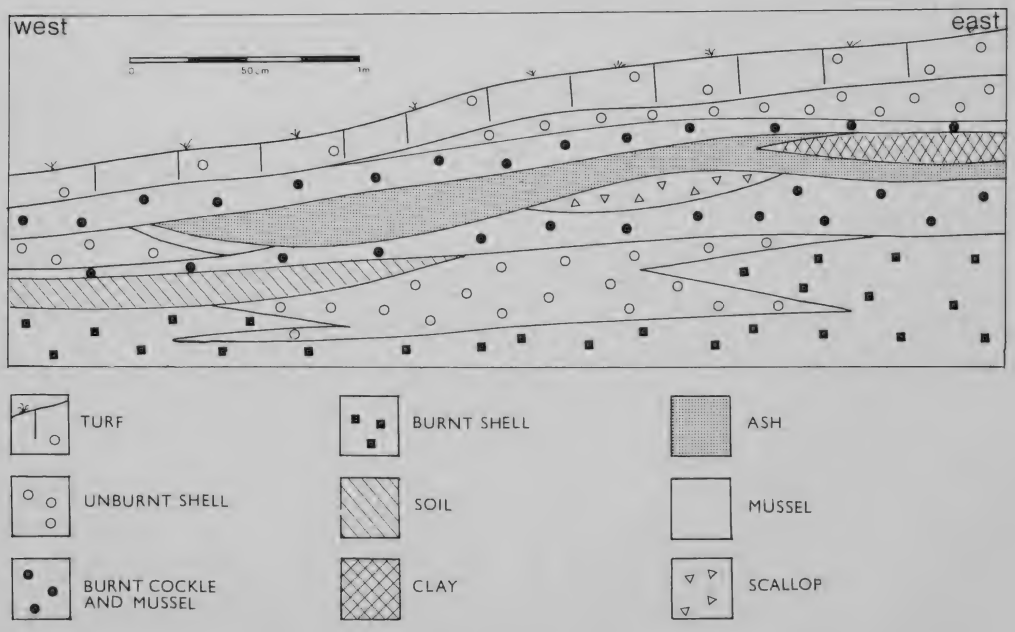


Fig. 8. Section from 1951 excavation of Midden M1. Drawn from Abercrombe MS.

M3. This midden was found to be similar to the previous two midden excavations. The turf layer was deeper and fewer oysters and whelks were present; fish bone was more common.

Swamp excavations

S1. The stratigraphy uncovered in S1 appears to have been straight forward; a turf layer of heavy damp soil, 22.8 cm in depth, overlay a 7.6 cm sterile "puggy mud" layer. Underlying this was a 15.2 cm deep cultural layer of blue-grey clay with an apparently sterile layer containing non-artefactual shell and rock beneath. In at least one of the subtrenches the "puggy" layer was absent. Artefacts found in the cultural layer included obsidian flakes (one perforated), a flint drill point, flint rock, a tree with signs of having been worked and chips of wood (Boyle MS.). Shell and rock and a number of human bones were also present (Butler MS.). Although it is not explicitly stated, the quantity and type of bones recovered suggest that they were derived from a burial. Many other burials have been reported from the immediate area, one being found "wrapped with string" as recently as 1976 (McKenzie pers. comm.). Other burials have been reported as eroding from the mudflats to the north of the pa (McKinlay pers. comm.).

S2. Both trenches put through S2 were found to contain 40.6-45.7 cm of heavy soil overlying a charcoal enriched clay layer, 22.8-35.6 cm in depth (Boyle MS., Butler MS.), with shell deposits being found at both end of trench (i) and the south end of trench (ii) (see Fig. 3). Which layer the shell deposits were in is not recorded. The trench cut into the southern area of the swamp contained a 91 cm layer of shell and "yellow powder" (Butler MS.), underlying a 38.1 cm layer of loose soil and sand. The presence of sand in the upper layer suggests that this trench may have been located near an old beach line. The shell deposits in this trench and indeed the swamp as a whole may, therefore, be natural. No artefactual material was found in these excavations.

S3. This trench likewise contained no artefactual material. It was excavated to a depth of 76.2 cm and consisted of a rich black soil layer with shell deposits throughout. The density of the shell varied with a 15.2 cm layer of concentrated shell being found 7.6 cm above the basal clay. There is no indication that the shell was cultural. Several peach tree stumps were found in the trench.

Base of the pa

B1. Two cultural layers were identified during this excavation. Although no description of the soil in either layer, beyond "both mostly shell and charcoal", is available, the upper layer (L.1) is recorded as having been 15.2 cm below the turf and of 15.2 cm depth. The lower layer (L.2), immediately below layer 1, was also 15.2 cm in depth. Since the trench was excavated in 15.2 cm spits the identification of two cultural layers each 15.2 cm in depth must be regarded as somewhat suspect. The type and distribution of material recovered from the trench (see Table 1) does, however, confirm the existence of two distinct cultural layers. It is not known from which layer an adze (32604, see Fig. 9) was derived.

There is no evidence to indicate that the area excavated was in fact a house site. No mention is made of post-holes, a hearth or a cooking area although it is possible that the

Table 1. Cultural material found in excavation B1.

Object	Museum No.	Layer	Comments
Bottle glass	—	1	—
Nails (Iron)	—	1	—
Screws	—	1	—
Clay pipe stems	—	1	—
Scissors	—	1	—
Gun flint	32583	1	—
Slate	—	1	Two pieces mentioned
Obsidian flakes	—	1	—
Shell	—	1&2	Found throughout both layers
Charcoal	—	1&2	Throughout both layers
Fish bones	—	2	—
Obsidian	—	2	—
Teeth	—	2	—
Human tooth pendant	32579	2	Human molar, perforated
Adze (Fig. 9)	32604	—	Duff 1956 type 2B*, mottled dark green/ grey argillite. Partly polished, working edge curves to right. Length, 9.7 cm.

*Duff 1956

size and position of the trench was such that it simply missed these features. It must, however, be concluded that this was not a *whare* site.

B2. There is no record of any stratigraphy encountered during this excavation. Shell and charcoal, obsidian, the broken end of a fish hook shank, a sharpening stone, a dog jaw and skull, kauri gum, a clay pipe stem and a toggle were found.

B3. The stratigraphy of this excavation is unknown as well. The artefacts found are listed in Table 2. There are several other artefacts, including several fish hook points and adzes, accessioned into the Auckland Museum collections in 1951 as having been found at the base of the pa. However, since there are no references to them in the fieldnotes there is no way of provenancing them to either area B2 or B3. They are, therefore, discussed below under "other finds".

Table 2. Cultural material found in excavation B3.

Object	Museum No.	Grid	Depth	Comments
Drill point	—	1		
Adze		1	Surface	?Not in museum coll.
Sandstone	—	2	—	
Obsidian	—	3,5&7	—	
Adze frag.	206/51	6	—	Dark grey argillite, finely polished. Fragment of working edge of finely polished quadrangular adze
Drill point	—	4	—	
Kauri gum	—	7	—	

B4. Thirty square metres were excavated. By the end of the first day the area had been turfed and at least grid 1 had been dug to a depth of 30.5 cm. Very little artefactual material was recovered (see Table 3) and that found was in the western and eastern ends of the plot. With the exception of a peach stone (possibly an intrusion into the site) no post-European material was recovered.

Table 3. Cultural material found in excavation B4.

Object	Grid	Depth (cm)
Peach stone	1.2	25.4
Fish bones	9.2	25.4
Obsidian	7.1	30.5
Fish bones	1.1	30.5
Oven	9.4	61.0
Oven	9.4	76.2

B5. Records were kept for the first two days of excavation only. It is known, however, that further work was carried out. The artefacts found are listed in Table 4. No details of stratigraphy are known.

Table 4. Cultural material found in excavation B5.

Object	Grid	Depth (cm)
Red ochre	7.1	Surface
Obsidian	2.2	5.1
Obsidian	4.2	5.1
Clay pipe stem	3.1	5.1
Red ochre	1.1	7.6
Pocket knife	2.1	10.2
Obsidian	4.2	10.2
Human tooth	6.1	10.2
Oven stones	9.3	12.7
Dog jaw & teeth	5.2	16.5
Dog bone	5.2	16.5

B6. This area, on the sandspit, was excavated over four days and proved to be artefact rich. The first days 'finds' are recorded as having been found ''in the clay layer'' which implies that at least two stratigraphic layers were recognised. However, as can be seen from Table 5, post-European material was found throughout the deposits.

B7. This excavation, approximately 10 sq m in area, also produced post-European artefacts (see Table 6). An oven was found at an unrecorded depth. It was 76 cm in diameter and had-an excavated depth of 1.5 m from the surface. It contained an unusually large quantity of material. Bird and human bone were found in the base of the oven and a change of layering within the oven — cockles, a 1.3 cm lens of fish bone and scallops — was noted.

Table 5. Cultural material found in excavation B6.

Object	Grid	Depth (cm)	Comments
Knife	—	15.2	
Stingray barb	3.2	15.2	*Myliobatis* sp.
Clay pipe stems	4 ext.	17.8	
Dog bone	5 ext.	17.8	
Dog bone	5.2	20.3	Recorded as having been broken
Clay pipe stem	3 ext.	22.9	
Glass	2 ext	22.9	
Sandstone	3 ext.	22.9	
Stingray palate	4 ext.	25.4	*Dasyatis* sp.
Clay pipe bowl	5.1	25.4	Found in clay layer
Tooth	5.1	25.4	Found in clay layer
Red ochre	2.1	25.4	Found in clay layer
Red ochre	6.1	30.5	
Dog tooth	5.2	30.5	
Stingray palate	2.2	30.5	*Dasyatis* sp.
Clay pipe stem	4 ext.	45.8	
Wooden button	3 ext	45.8	

Table 6. Cultural material found in excavation B7.

Object	Grid	Depth (cm)	Comments
Iron pieces	2.1	10.2	
Red ochre	2.2	15.2	
Peach stones	1.2	15.2	
Human bone	1.2	22.9	
Human jaw bone	2.2	22.9	
Dog tooth	1.3	22.9	
Rat bone	1.1	25.4	
Clay pipe stem	1.3	25.4	
Tattooing blade	2.2	30.5	
Obsidian	2.1	61.0	
Human bone	5.1	—	Recorded as worked
Fish hook shank	5.1	—	5.1 cm from oven
Red ochre	5.1	—	15.2 cm from oven
Oven	5.1	—	Excavated depth of 1.5 m. Contained peach stones, pig tusk, human bone bird & fish bone, cockles, scallops, 3 clay pipe stems, obsidian, nail

B8, B9. No details of the stratigraphy or the depths of the artefacts found have survived from these two excavations. A piece of glass, obsidian and fragments of human and whale bone were found in the 5.9 sq m area of excavation B8 while only one artefact, a fish hook point, was found in the 4.2 sq m area of B9.

B10. The trench excavation B10, was dug to a depth of 15.2 cm at one end and 30.5 cm at the other. Charcoal, rocks and a piece of worked bone were recovered.

B11. A "series of fish hook shanks" were found at a depth of 15.2 cm in this excavation. No details of stratigraphy are recorded and unfortunately the shanks cannot be identified amongst the Oue Pa assemblage in the Auckland Museum.

Top of the pa

T1. No information about excavation T1, on the *tihi,* is available. A bone tattooing chisel, two hammerstones, a bird spear point and a bone needle were accessioned into the Museum collections in 1951 as being "found on the terrace" at Oue Pa. These may have been recovered from this plot. They are described under "other finds".

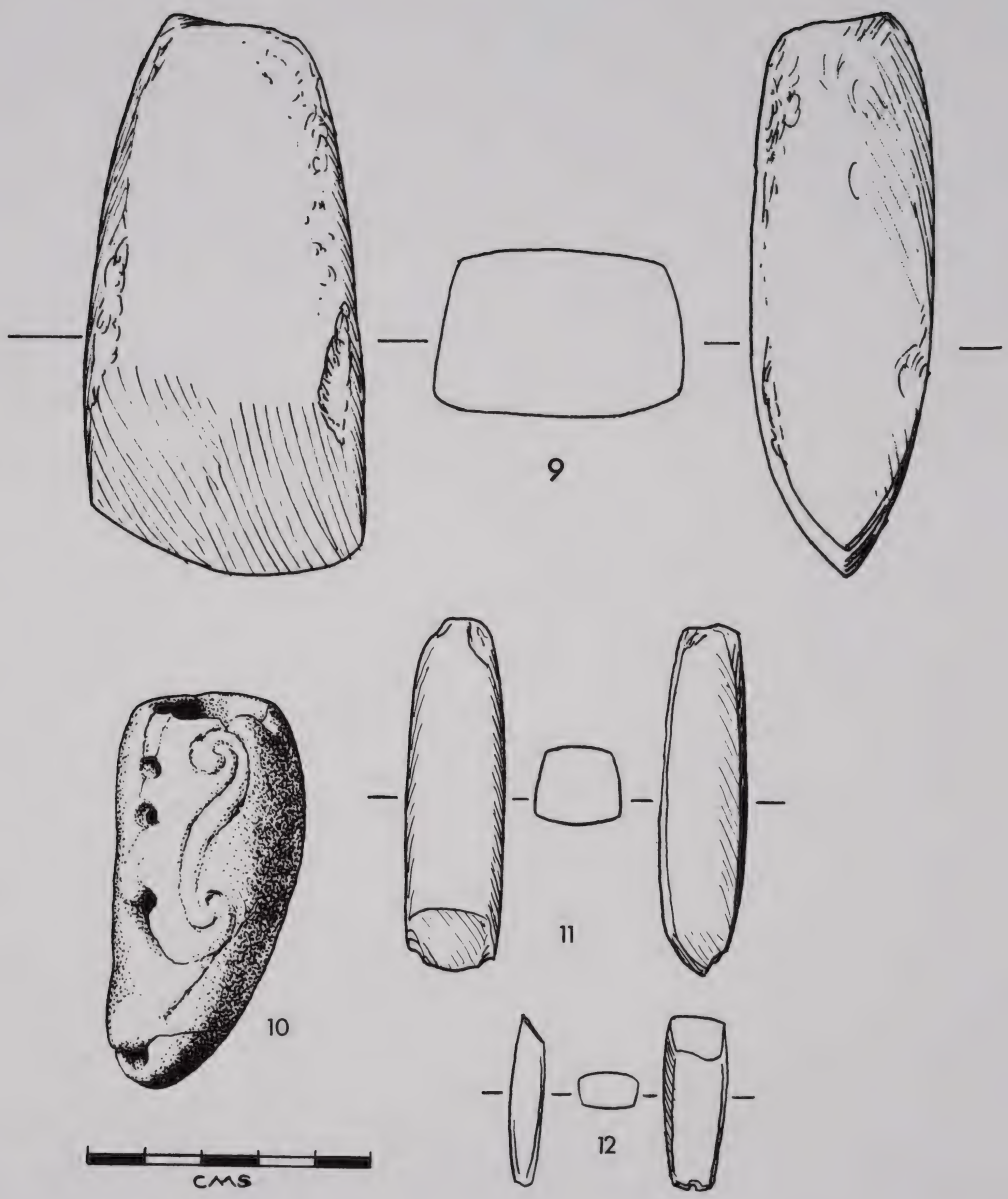
T2. The material found in this 9.2 sq m area is listed in Table 7. No details of stratigraphy are known.

Table 7. Cultural material found in excavation T2.

Object	Grid	Depth (cm)
Fish bone, scales, shell	1-12	Turf layer
Obsidian flake	2	2.5
Cloak pin ? (fragment)	2	2.5
Obsidian flake	1	6.4
Dog jaw bones	4	7.6
Obsidian flake	2	7.6
2 Obsidian flakes	1	10.2
Chert flake	7	15.2
Obsidian flake	3	30.5
Dog tooth	7	30.5
Obsidian flake	3	35.6
Fish hook shank	—	—

T3. The methods used to excavate this bank were no doubt similar to those employed during the excavation of the road bank cutting at the base of the pa (B2). Two cultural layers were identified. As with excavation T2 above, no post-European artefacts were recovered from this plot. The upper layer was 10.2 cm in depth and contained shell midden. An underlying layer (L. 2) was 30.5 cm deep. A dog skull, dog mandible, a toggle, a *nguru* (flute), ochre and charcoal were found. The *nguru* (32582, see Fig. 10) is particularly interesting. It is made of sandstone, has three stops and is 6.6 cm in total length the body being 3.2 cm in diameter. It has been perforated for suspension under the aperture and is decorated with a spiral on one side. It is almost complete having been reconstructed from many fragments. Although not mentioned in the field notes, the damage was probably incurred during excavation.

A section drawing of the "bank near where the flute was found" also records two layers. The upper one was 30.5 cm in depth and contained many obsidian flakes, while the lower layer was 22.9 cm deep. Bird and fish bone and an oven are also recorded, but not stratigraphically.



Figs. 9-12. Stone artefacts from Oue Pa. 9. Adze, 32604, excavated from area B1. 10. *Nguru,* 32582, from excavation T3. 11. Nephrite chisel, 32587. 12. Nephrite chisel pendant, 32599.

T4. On this terrace 30.1 sq m were excavated in 15.2 cm spits over a period of four days. With the exception of rabbit bones, found on the first day of work, none of the material recovered was post-European. The rabbit bones were found at a depth of 7.7 cm and are, therefore, most likely to have been an intrusion into the site. The cultural deposits were deep, 1.07 m being recorded for the southern end of the plot. There is not, however, any record of stratigraphic divisions. Cultural material excavated from the plot is listed in Table 8. Two ovens were found in the northern half of the excavation, at depths of 45.8 cm and 76.2 cm. Since no artefacts were derived from the 30.5 cm which separate them it is possible that there was a non-cultural layer between. However, descriptions of the soil horizons encountered and the degree of slope of the excavation (if any) are not available. Nor is the number of artefacts recovered sufficient to do a statistical analysis, by level, of their distribution. It cannot, therefore, be inferred that there were two distinct cultural layers within the excavated area.

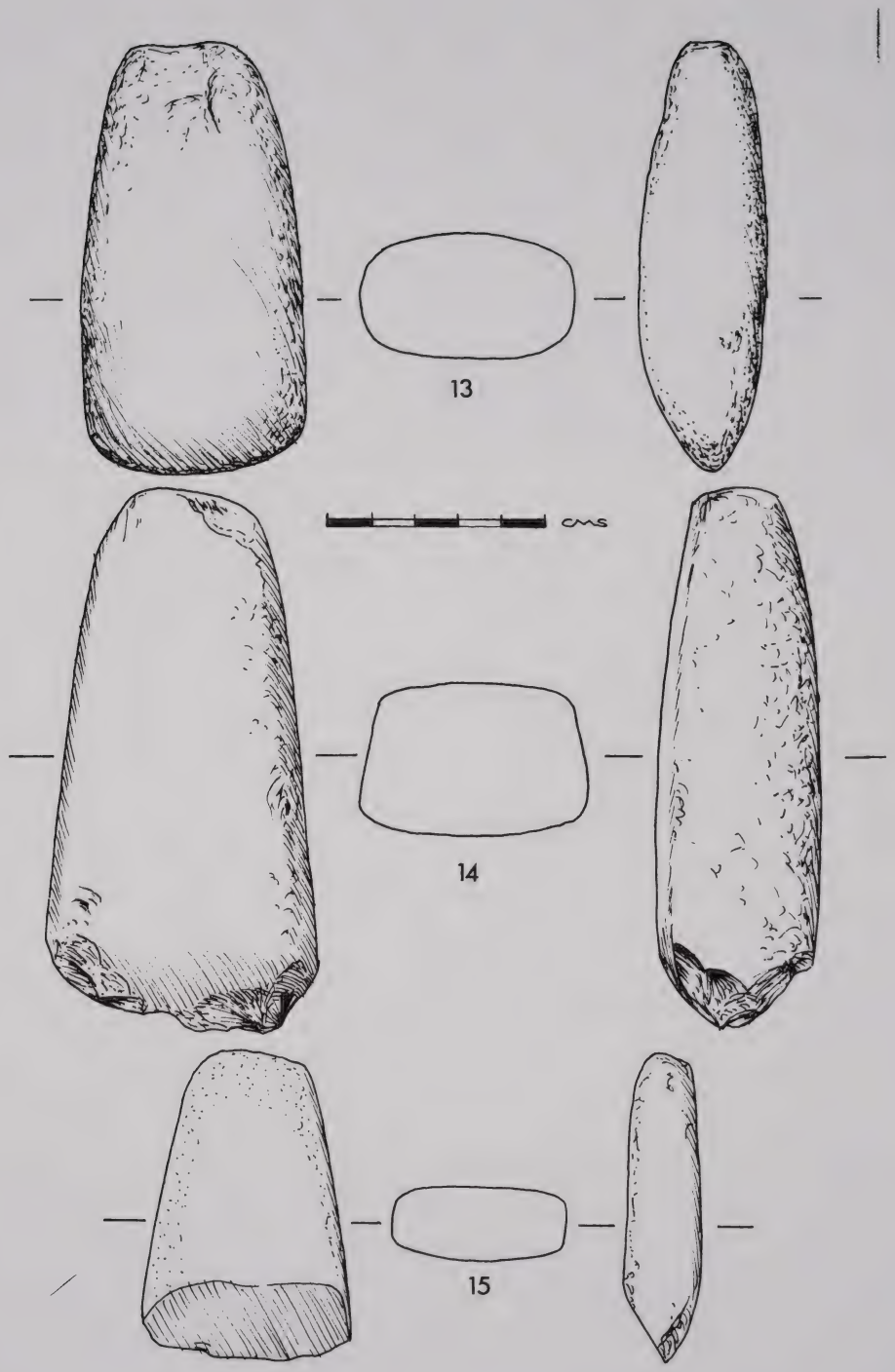
Table 8. Cultural material found in excavation T4.

Object	Grid	Depth (cm)	Comments
Unfinished shell pendant	2.2	surface	Not in museum's collection
Rabbit bones	7.3	7.6	Possibly an intrusion into site
Dog tooth	4	15.2	
Unfinished *nguru*	8.1	15.2	Not in museum's collections
Dog tooth	9	30.5	
Human bone (worked)	2	30.5	
Oven	1	45.8	
Stingray palate	2	45.8	
Bird spear point	5	45.8	Made of stingray barb. ?Not in museums's collections
Oven	4	76.2	
Fish hook point	8.4	76.2	?Not in museum's collections
Fish hook point	7.2	91.4	?Not in museum's collections
Human bone (worked)	4	106.7	
Bird bone	1.3	—	Identified in 1952 as that of a kingfisher

T5. Only one artefact, a fish hook point, was found in this excavation. No further details of the investigation are known.

Other finds

Many of the artefacts excavated from Oue Pa in 1952 and 1953 are in the Auckland Museum but cannot now be localised to excavated area. Other artefacts in the collection are provenanced to a general area within the pa but are either not mentioned in the fieldnotes or not described fully enough to enable a positive association with excavated area. Only the more important of these are included in this report.

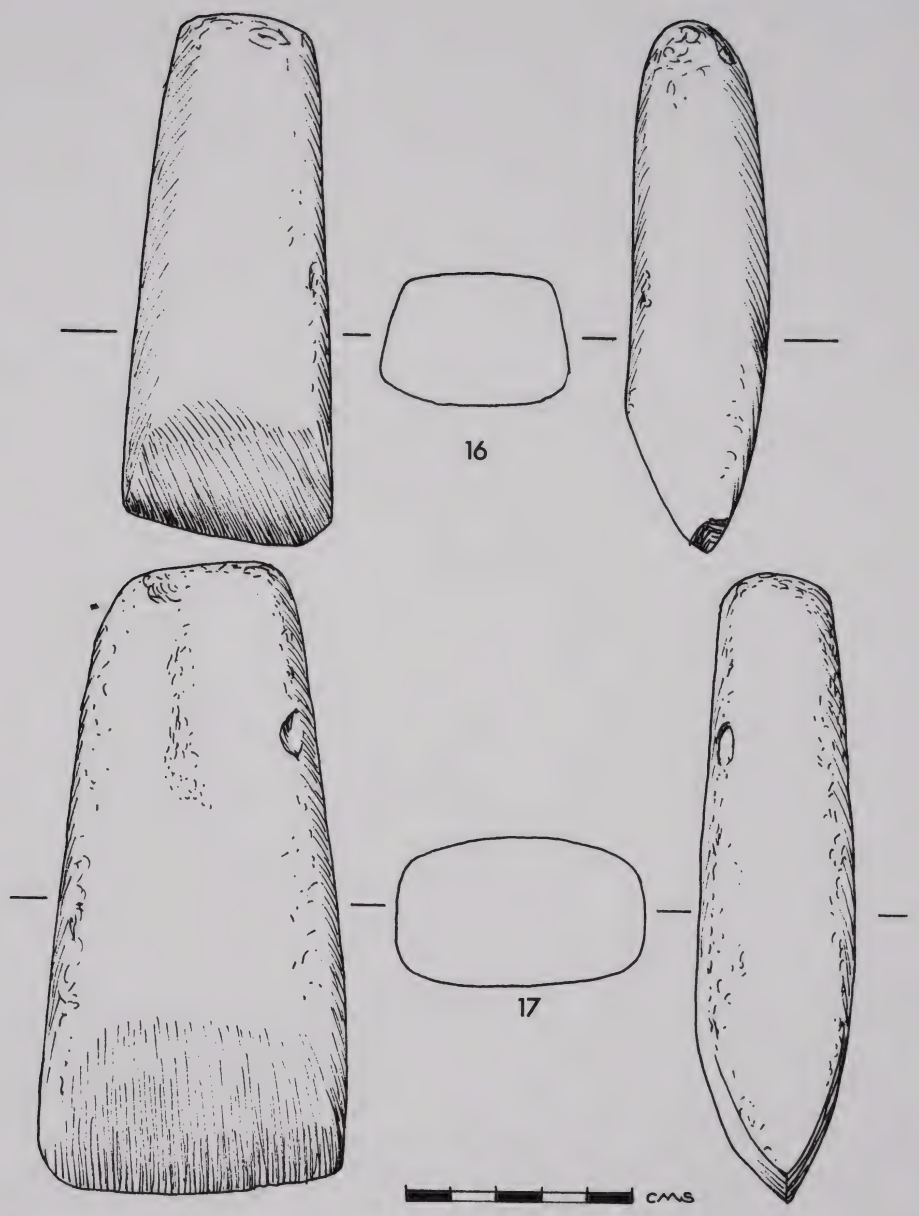


Figs. 13-15. Adzes from Oue Pa. 13. 32606. 14. 206/51. 15. 32611.1.

A description of an unlocalised chisel (Fig. 11), a chisel pendant (Fig. 12), an adze (Fig. 13) found on the mudflats, eight unlocalised adzes (of which four are illustrated, see Figs. 14-17), and an adze (Fig. 18) surface collected in 1968, is given in Table 9. Other stone artefacts found include a sinker (Fig. 19), a hammer (Fig. 20), two other hammerstones, a broken patu (Fig. 21), grinding stones, obsidian flakes and an obsidian core. A description of these is given in Table 10. A fernroot beater (Fig. 22), a top (Fig. 23) and another wooden artefact, possibly the handle of a beater (Fig. 24) are described in Table 11.

Table 9. Unprovenanced adzes and chisels from Oue Pa.

Museum No.	Fig.	Provenance	Comments
32606	13	Surface Mudflats	Dark grey argillite, Duff type 2B. partly polished Length, 9.9 cm.
206/51	14	Unlocalised	Dark grey argillite. Duff type 2B. Broken 12.5 cm from poll. Polished
32611.1	15	Unlocalised	Green/brown argillite. Duff type 2B Polished L, 14.1 cm
32611.2	—	Unlocalised	Grey argillite. Duff type 2B Polished and chipped. L, 14.9 cm
32611.3	16	Unlocalised	Dark grey argillite Duff type 2B. Polished L, 11.5 cm
32611.4	—	Unlocalised	Unseen. Length, 13.1 cm
32611.5	—	Unlocalised	Grey argillite Duff type 2B. Polished. L, 5.5 cm
32611.6	—	Unlocalised	Grey/green greywacke. Duff type 2B. Polished. L, 7.0 cm
32611.7	17	Unlocalised	Grey argillite Duff type 2B. Polished. L, 7.1 cm
39537	18	Surface (1968)	Green argillite. Triangular in cross section. Front flaked sides have some of the original polish. Reworked from large quadrangular adze. L, 11.8 cm
33587 (chisel)	11	Unlocalised	Dark brown/grey argillite. Polished. Quad. in cross section. Working edge chipped. L, 6.1 cm
32599 (Pendant)	12	Unlocalised	Nephrite, quadrangular in cross section with chisel edge. Broken across perforation at poll. L, 3.0 cm



Figs. 16, 17. Adzes from Oue Pa. 16. 32611.3. 17. 32611.7.

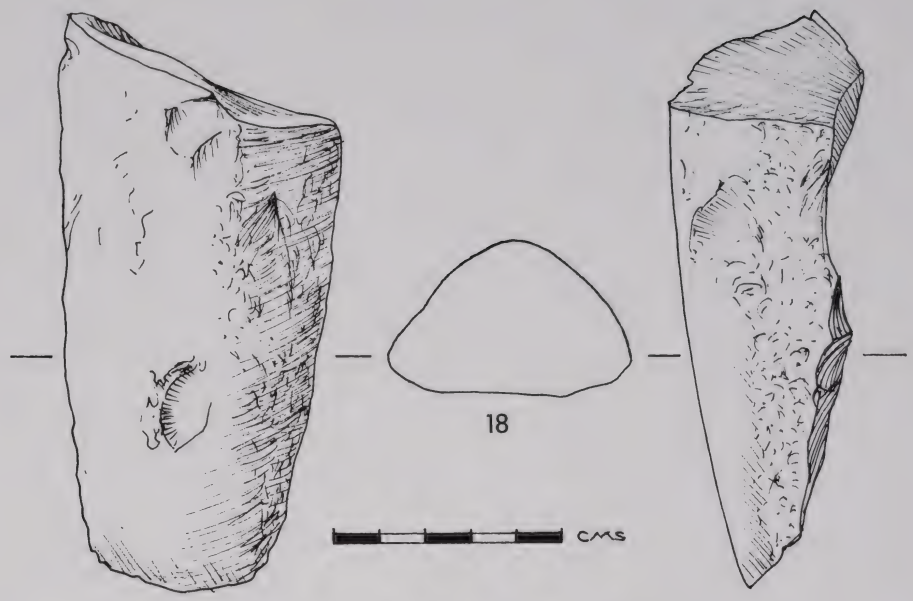
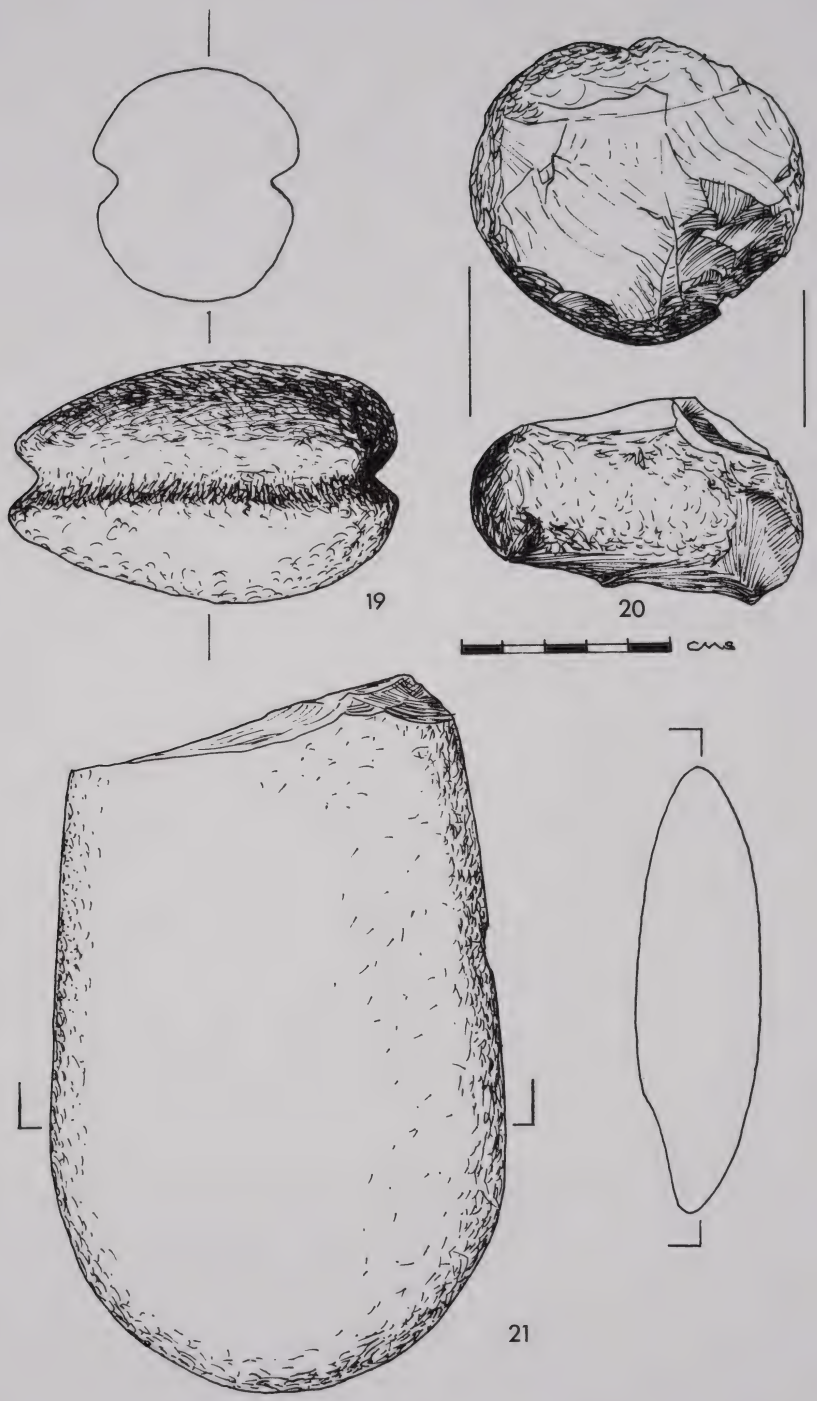


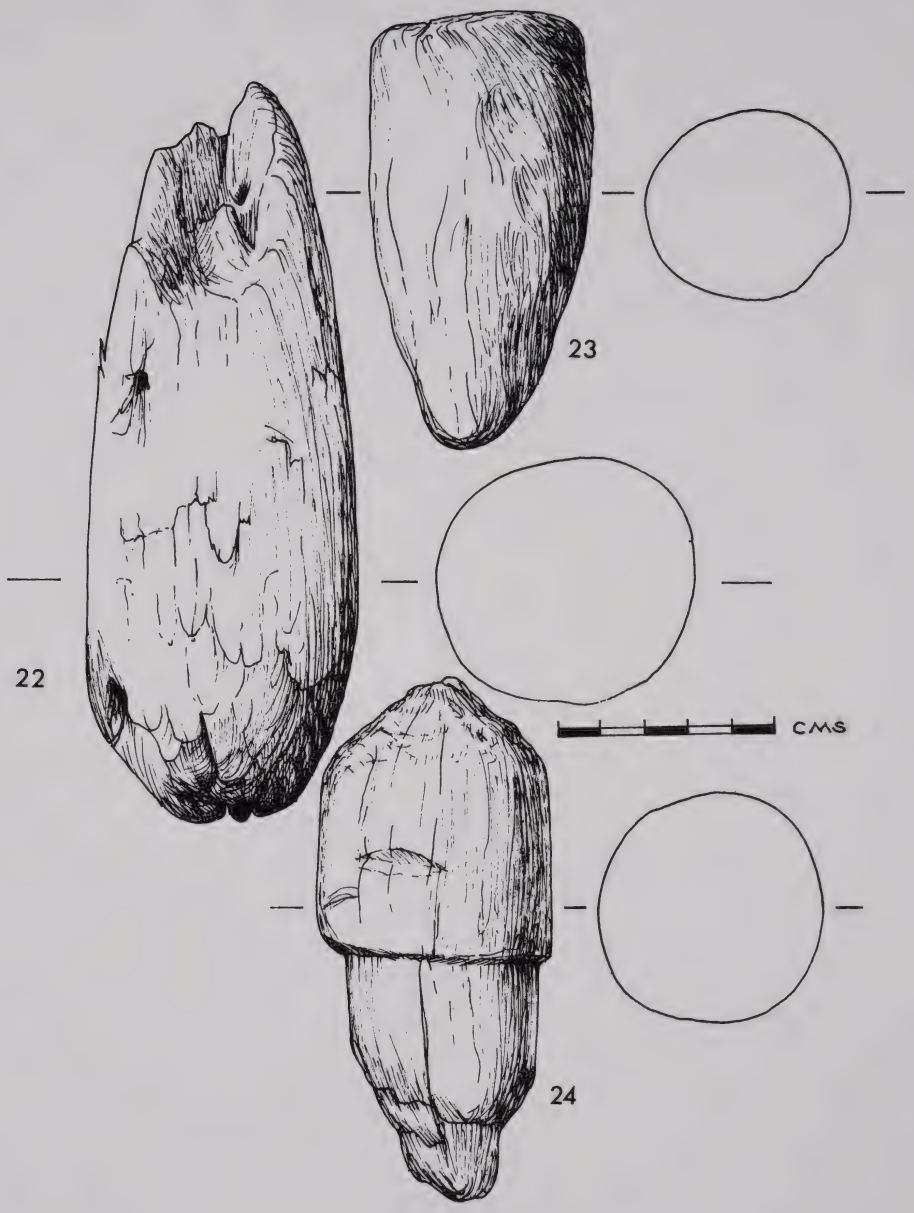
Fig. 18. Adze from Oue Pa. 32537.

Table 10. Unprovenanced other stone material from Oue Pa.

Artefact	Museum No.	Fig.	Provenance	Comments
Sinker	32590	19	Unloc.	Volcanic. Central Longtitudinal groove. L, 9.3 cm
Patu	32608	21	Unloc.	Greywacke, unpolished. Handle broken off. L, 16.0 cm
Hammerstone	32590	—	Terrace (1951) ? Tihi	Pebble, bruised flat both ends. Traces of red ochre. L, 5.8 cm
Hammerstone	32591	—	,,	Pebble, worn to cone shaped points each end. L, 11.3 cm
Hammer	39539	20	Surface (1968)	Discoid, brownish grey chert. Worn around perimeter. Diam, 8.2 cm
Grindingstones (2)	32610	—	Unloc.	Sandstone. Both grooved through use.
Obsidian flakes (7)	—	—	Unloc.	3 green, 4 grey. Some with use damage
Obsidian core	—	—	Unloc.	Small, green



Figs. 19-21. Stone artefacts from Oue Pa. 19. Sinker, 32590. 20. Hammerstone, 39539. 21. Patu, 32608.



Figs. 22-24. Wooden artefacts from Oue Pa. 22. Fernroot beater. 23. Top. 24. ?Handle of beater.

Table 11. Unprovenanced wooden artefacts from Oue Pa.

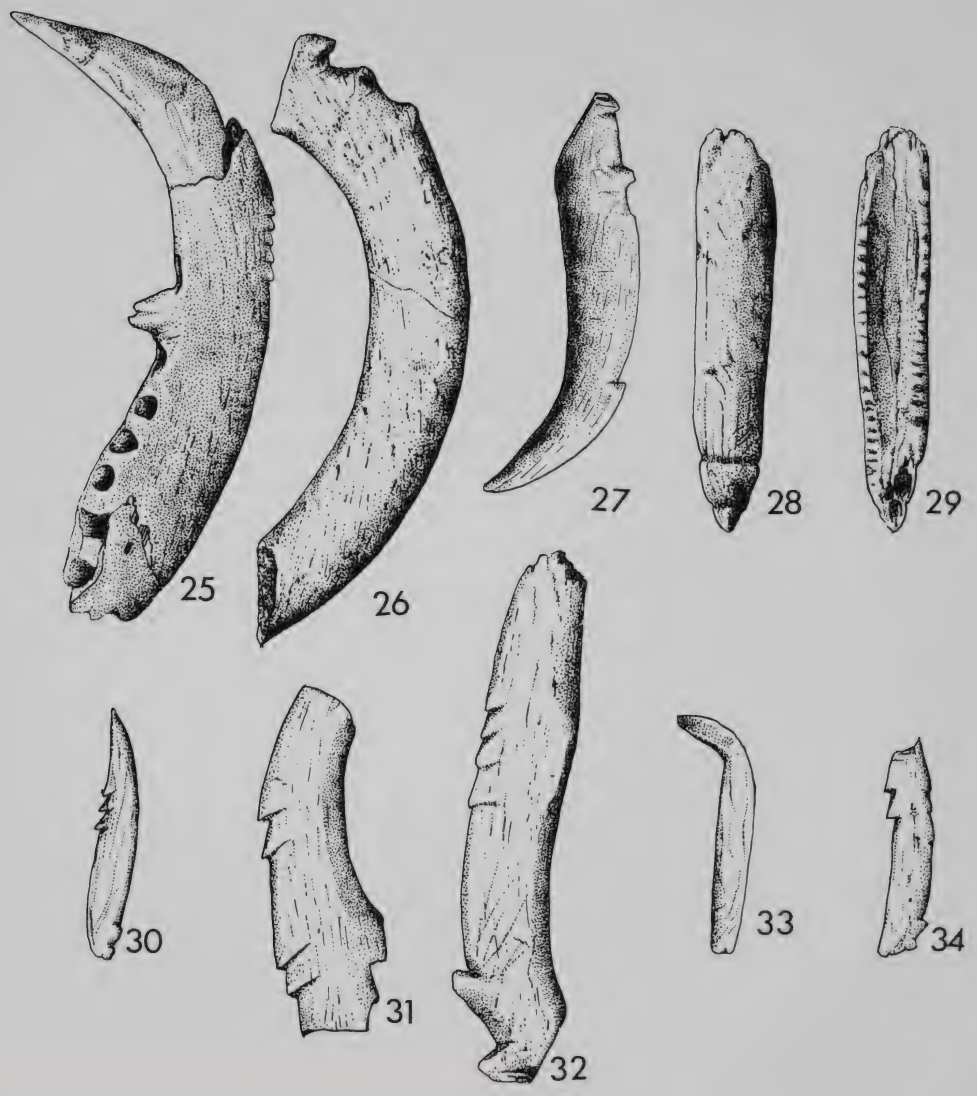
Artefacts	Museum No.	Fig.	Provenance	Comments
Top	32580	23	Unloc.	Cone shaped with point showing signs of use. L, 9.8 cm Diam prox. end, 4.7 x 5.4 cm
Fernroot Beater	32607	22	Mudflats (surface)	Handle broken off. Weathered and insect holes on one side. Length, 16.8 cm
?Handle of Beater	32578	24	Unloc.	Burnt & broken at distal end. Length, 11.7 cm

Table 12 includes a composite bait hook shank (Fig. 26) and point (Fig. 27) which were found in association at the base of the pa, another shank (Figs. 28-29) and composite bait hook points (Figs. 25, 30-32) also found at the base of the pa and two unlocalised points (Figs. 33-34). Four bird spear points (of which two are illustrated, see Figs. 35-36), tattooing chisels, a dog bone chisel (Fig. 37), a toggle (Fig. 38), a needle (Fig. 39) and a worked echinoderm spine (Fig. 40) found on the site are described in Table 13.

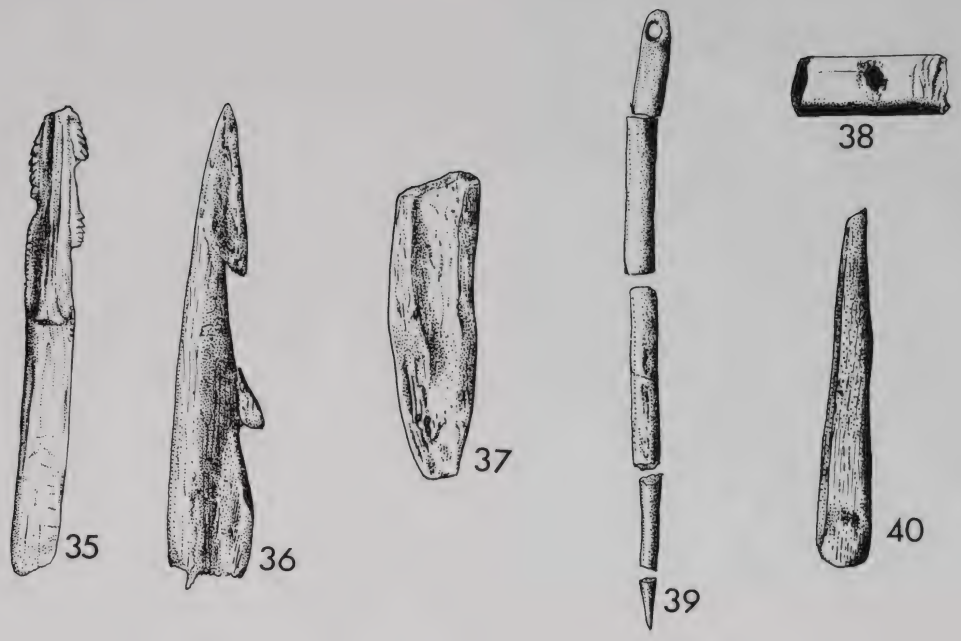
Table 12. Unprovenanced composite bait hooks from Oue Pa.

Artefact	Museum No.	Fig.	Provenance	Comments
Point	32592	25	Base of Pa	Unfinished point of dog bone (mandible)
Shank	32579.1	26	Base of Pa	Broken. Dog bone. Found in association with 32579.2
Point	32579.2	27	"	Dog bone. One external barb
Shank	32595	28&29	Base of Pa	Dog mandible. Internal side hollowed. Incised with series lines along internal edges
Point	32600	30	Base of Pa	Bird bone. 3 internal barbs
Point	32584.1	31	Base of Pa	Broken both ends. Internally and externally barbed. Dog bone
Point	32584.2	32	Base of Pa	Broken, dog bone. Internally and externally barbed
Point	—	33	Unloc.	Bird bone. Incurved point. Possibly unfinished. Unbarbed
Point	—	34	Unloc.	?bird bone. Multibarbed — internally and externally

There are several other pieces of worked and unworked whale, dog, human and rat bone and dog, pig and human teeth. The stingray palates found are those of *Dasyatis* sp. (J. Darby pers. comm.). Altogether there are seven pieces of unworked dog mandibles in the asemblage. Of these, five (3 lefts and 2 rights) were found at the base of the pa in 1951. A further left side from the 1953 terrace excavation (T2) has survived and an unlocalised fragment of a left mandible found in either 1952 or 1953.



Figs. 25-34. Composite bait hook shanks and points from Oue Pa. 25. Unfinished point, 32592. 26. Shank, 32579.1. 27. Point, 32579.2. 28, 29. Shank, 32595. 30. Point, 32600. 31. Point, 32584.1. 32. Point, 32584.2. 33, 34. Points, unnumbered.



Figs. 35-40. Bone artefacts from Oue Pa. 35. Bird spear point, 32587. 36. Bird spear point, 32602. 37. Chisel, 32601. 38. Toggle, 32585. 39. Needle, 32596. 40. ?Chisel, 32598.

Table 13. Unprovenanced other bone artefacts from Oue Pa.

Artefact type	Museum No.	Fig.	Provenance	Comments
Bird spear point	32577.1	—	Unloc.	*Myliobatis* sp. barb. Modified at proximal end for insertion into shaft. Several small 'teeth' removed from each side
Bird spear point	32577.2	—	Unloc.	*Myliobatis* sp. barb. Modified at proximal end
Bird spear point	32587	35	Terrace	*Myliobatis* sp. barb 2 external, 1 internal barb, base modified
Bird spear point	32602	36	Unloc.	?Dog bone with 2 internal barbs. Broken
Tattooing chisel	32594	—	Base of pa	Not seen
Tattooing chisel	32593	—	Base of pa	Toothed and perforated Not seen.
Chisel	32601	37	Base of pa	Dog bone with chisel edge at one end
Toggle	32585	38	Either B2 or T1	Bird bone tube, perforated
Needle	32596	39	Terrace	Echinoderm spine. Perforated at proximal end. Broken
?Chisel	32598	40	Unloc.	Echinoderm spine. Elongated with very small chisel edge at one end

DISCUSSION

Traditionally Oue Pa was occupied in the early nineteenth century. During the Maori Land Court hearing of the claims to the Whakakaiwhara Block in 1866 (Maori Land Court 1866) a dispute arose between Ngaitai (a semi-autonomous *hapu* of Ngati Paoa) and Te Hingawaka (a *hapu* of Ngati Paoa) over ownership of Oue Pa. Evidence presented to the Court in support of Te Hingawaka's successful claim to Oue and the surrounding 63 acres (25.5 hectares) was to the effect that Te Hingawaka had lived at Oue in the "old days" until 1821 when Hongi Hika's arrival caused them to abandon the area and move into the Waikato. A disagreement with the Waikato tribes (probably in 1831, see Fenton 1879:68) resulted in their return to Hauraki where Te Hingawaka once again took possession of Oue. They lived there continuously until trouble broke out between the Maoris and the European settlers in 1863.

The archaeological evidence presented above indicates that this post-European settlement was around the base of the pa, particularly on the Northwest side and the sandspit. In addition, the stratigraphy of the excavation under the karaka tree (area B1) indicates that there was a pre-European occupation here as well. On top of the pa there is no evidence of a post-European occupation: therefore the two cultural layers must be attributed to an earlier period. Whether these represent two separate occupations cannot be determined from the data.

There is little information available about the economy represented in the northern area. Fragmentary shell deposits were found throughout most of the excavations and fish, bird, pig and rat bone were also recorded in various places. An oven on the western side of the pa contained cockles, scallops, fish and bird bone. In addition, some information can be obtained from the artefacts; there was a considerable quantity of industrial dog bone and stingray barbs and a fernroot beater was found.

The southern area of the pa is poorly represented by excavation. Only one area which is not a midden was investigated and the report of it is unsatisfactory. The locations of the midden mounds, however, suggest that they were formed during the occupation of the southern area and their sheer volume argues for an extensive occupation.

The shellfish species in the midden show that the occupants were exploiting a wide range of ecological zones. The most important shellfish, cockles, are available in the estuary around the pa. Pipis can be obtained there as well and scallops were present in the estuary until the 1930s (C. Duder pers. comm.). Mussels may have been obtained from the rocky shores of the Whakakaiwhara Peninsula a few kilometres to the north.

Unfortunately no samples of bird and fish bone were kept. The number and species of birds available from the surrounding mudflats, swampland and bush covered ranges to the west must have been considerable. The mudflats and deeper waters of the Hauraki Gulf also must have provided an abundant marine life for ready exploitation.

There are no kumara storage pits on Oue Pa. This is unusual in an area where there is plenty of agricultural land available and the climatic conditions are suited to kumara cultivation. A plan of Whakakaiwhara Block drawn for the Maori Land Court on November 18, 1865, shows areas of "native cultivations" immediately to the south and

northwest of Oue Pa. The archaeological evidence argues against sporadic occupation in times of trouble; it is more likely that the kumara were stored elsewhere. Approximately 500 m to the southeast of Oue Pa lies another headland pa, N43/36. This contains at least 40 pits within the defended area (Easedale MS.). Little is known about the history of this site; it may well have been used, when required, for storage by the occupants of Oue Pa.

The number of dog mandibles, fish hooks and grinding stones show that the manufacture of composite bait hooks was one important activity being carried out at Oue Pa. It is likely that bird spear points were also made *in situ*. There is no evidence to suggest that adzes were being manufactured. Indeed the evidence is to the contrary; no flakes apart from obsidian were noted as present. The wooden top, the *nguru* and the number of clay pipes found indicate that time was taken for music and games.

The artefactual material recovered from Oue Pa shows marked similarities to the Classic Maori assemblage from Oruarangi Pa (N49/28) on the eastern side of the Hauraki Plains, near Thames.

With the exception of an unfinished adze (39357 Fig. 18), the adzes found at Oue Pa all fall within the range of those described by Fisher (1936) as type A and B from Oruarangi (see also Shawcross & Terrell 1966, Best 1980). They are quadrangular in cross section with the front usually wider than the back, polished on all surfaces and untanged.

The composite bait hook points also are similar in type to some of those from Oruarangi (see Fisher 1935, Teviotdale & Skinner 1947) although there are no "Oruarangi Points". There is, however, one point with a single external barb (32579.2, Fig. 27). The absence of dog tooth points from Oue Pa is surprising given the amount of dog material on the site. A preliminary examination of the dog bone suggests that the dogs were immature or young animals when they died (J. Darby pers. comm.) so it may be that the teeth were unsuitable for fish hook manufacture. Bird spear points made from stingray barbs were also reported from Oruarangi (Fisher 1934). They do not appear to have been notched, as one of the Oue Pa examples is, but were identified as bird spear points on the basis of the modficiation of the proximal edge (Fisher ibid.).

The *nguru* from Oue Pa is also similar to those found at Oruarangi. All eight measured by Fisher (1937) have two stops; the three complete examples from Oruarangi in the Otago Museum's collections also have two stops. A number of the *nguru* are decorated, their dimensions are variable and they are made from a number of materials, including sandstone. The Oue Pa example is decorated, made of sandstone and falls within the size range of the Oruarangi ones, but it has three stops.

The long history of archaic and Classic Maori occupation of Oruarangi Pa has recently been discussed by Best (1980). While 20% of the adzes, the stone reels, one piece bait hooks and possibly the *waha ika* (Best ibid.) from Oruarangi possess archaic affinities, the Oue Pa assemblage, discussed above, does not share these characteristics.

CONCLUSIONS

The archaeological evidence presented shows that there were at least two, possibly three, occupations of Oue Pa. There was an extensive post-European settlement, which traditional history indicates was finally abandoned in 1863, around the base of the pa. This area and the top of the pa were occupied in the pre-European period as well. There are no dates for this occupation. However, a comparison of the artefacts with those from Oruarangi suggests that it dates to the late pre-European period.

Clearly further investigation of Oue Pa is worthwhile and may well help to elucidate some of the problems surrounding the defintion of the Classic Maori period in New Zealand.

Acknowledgements. I wish to thank the landowner, Mr B. Duder and his father Mr C. Duder for access to Oue Pa and for useful discussions about the site and surrounding area. Mrs McKenzie (North Road, Clevedon) and Mr J. McKinlay (Senior Archaeologist, N.Z. Historic Places Trust, Wellington) have also provided valuable information about the pa and its excavation.

Mr D. Simmons (Ethnologist, Auckland Museum) kindly gave me permission to study the Oue artefactual assemblage and manuscripts in the museum in 1977 and 1980. Ms Janet Davidson (University of Otago) and Dr A.J. Anderson (University of Otago) have both given helpful comments on this paper. Dr A. Reay (University of Otago) identified the stone and Mr J. Darby (Otago Museum) the bone material. The illustrations were done by Mr L. Cowell and Mr L. Esler (Otago Museum).

Finally I would like to thank Lady Aileen Fox (Auckland Museum) for her continued interest and encouragement during the preparation of this report.

REFERENCES

ABERCROMBE
MS. Unpub. project, History Dept., Ardmore Teachers College. 1951.

BEST, S
1980 Oruarangi Pa: Past and Present Investigations. *N.Z. J. Archaeol.* 2:65-91.

BOYLE
MS. Unpub. project, History Dept., Ardmore Teachers College. 1951.

BUTLER
MS. Unpub. project, History Dept., Ardmore Teachers College. 1951.

DUFF, R.
1956 *The Moa Hunter Period of Maori Culture*. 2nd ed. Govt. Printer, Wellington. 400p.

EASEDALE, S.
MS. Unpub. 03.208 project, Dept. of Anthropology, University of Auckland. 1977.

FENTON, F.D.
1879 *Important Judgements 1866 - 1879*. Native Land Court. 147p.

FISHER, V.F.
1934 The Material Culture of Oruarangi, Matatoki, Thames, 1. Bone ornaments and implements. *Rec. Auckland Inst. Mus.* 1(5):275-286.
1935 The Material Culture of Oruarangi, Matatoki, Thames, 2. Fish hooks. *Rec. Auckland Inst. Mus.* 1(6):287-300.
1936 The Material Culture of Oruarangi, Matatoki Thames 3. Stone implements and Ornaments. *Rec. Auckland Inst. Mus.* 2(1):15-27.
1937 The Material Culture of Oruarangi, Matatoki Thames, 4 Musical Instruments. *Rec. Auckland Inst. Mus.* 2(2):111-118.

MAORI LAND COURT
1866 Hauraki Minute Book No. 1. Whakakaiwhara Block. Microfilm, University of Auckland Library.

NICHOLS, M.P.
1964 Excavations of Ponui Island *Rec. Auckland Inst. Mus.* 6(1):23-38.

SHARPLIN
MS. Unpub. project, History Dept., Ardmore Teachers College. 1951.

SHAWCROSS, F.W., and J.E. TERRELL
1966 Paterangi and Oruarangi Swamp Pas. *J. Polynes. Soc.* 75:404-430.

TEVIOTDALE, D., and H.D. SKINNER
1947 Oruarangi Pa. *J. Polynes. Soc.* 56:340-356.

TONSON, A.E.
1966 *Old Manukau.* Tonson Publishing House, Auckland. 336p.

MAMMALIAN FAUNA FROM AN ARCHAIC SITE ON MOTUTAPU ISLAND, NEW ZEALAND

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Abstract. Mammalian fauna from the Pig Bay site (N38/21) on Motutapu Island, most of which dates from the 14th to 17th centuries A.D. is described. The range of species identified is narrower than that observed in contemporary sites from adjacent areas, and dogs appear to have formed a significant part of the diet throughout the occupational sequence. Patterns of tooth wear in dogs show similarities with other Archaic North Island sites, and the observed butchering patterns suggest exchange or sharing of dog carcasses.

Archaeological evidence of early Polynesian occupation in the Auckland area is rare. Material belonging to this period has been recovered from four coastal middens — the Sunde site (N38/24) and Pig Bay (N38/21) on Motutapu Island, a midden (N43/1) on Ponui Island, and the Wattle Bay site (N46-47/16) just inside the entrance to the Manukau Harbour — and two inland living sites at Wiri Mountain (N42/24) and Mount Wellington (N42/4) (Davidson 1978:2-4). Although not all precisely dated, the Archaic levels of these sites appear to lie within the period A.D. 1350 - 1500 (ibid). The lowest levels of the Sunde site, sealed below ash from the eruption of Rangitoto, comprise the earliest dated occupational evidence from the region. This occupation occurred immediately prior to the eruption which is dated to the 14th or early 15th century (Law 1975). With the possible exception of Wiri Mountain and Wattle Bay, the remaining material postdates the ash shower, and radiocarbon dates from the Sunde site (Davidson 1974:9) and Pig Bay (Brothers & Golson 1959:571) suggest continuation of the Archaic into the 16th century.

Understanding of the economic activities during this period is limited to published accounts from two sites. Evidence for probable field systems associated with a living terrace at Wiri Mountain has been discussed by Sullivan (1975), and Scott (1970) has analysed a small faunal sample from the Sunde site. The largest faunal sample from any Auckland Archaic site is that from Pig Bay, and in this paper an attempt will be made to further our understanding of economic activities through a detailed analysis of the mammalian component of that fauna. This material derives from excavations directed by Golson in 1958 (Golson 1959, Golson & Brothers 1959, Brothers & Golson 1959) and is now housed in the Auckland Museum.

The site

The Pig Bay site is located adjacent to a stream behind the beach in the western part of Administration Bay on Motutapu Island. Excavations revealed cultural material lying beneath recent dune sand and above a thick band of Rangitoto ash (Golson 1959, Golson & Brothers 1959, Brothers & Golson 1959). The cultural material was deposited within

three types of strata, here termed lower, middle and upper. The lower stratum, immediately above the primary deposit of Rangitoto ash, was composed of wind blown ash and beach sand up to 1 m in depth, indicating a period of post-eruption dune building. Sparse cultural material was located in the upper 45 cm. Above these dunes the middle stratum contained layers of dense midden and a wide variety of artefactual and occupational debris, stratified between lenses of water laid ash. During this period the site appears to have been on the margins of a lagoon which was formed when the ash-laden dunes damned the stream. The interspersed ash lenses represent periods of flooding of the site (Brothers & Golson 1959:575). The upper stratum was composed of wind blown sand with none of the water borne ash component, indicating that by this time the dune barrier had been breached and the site was no longer on the edge of a lagoon. Occupational evidence in the upper stratum was sparse, with only "a few thin middens of shell and fishbone with virtually no associated material culture" (ibid.).

Within these three broad strata, and in particular the middle stratum, stratigraphy was complex and not easily amenable to reconstruction. The earliest occupation of the site appears to have occurred during the post-eruption dune building phase. The sparse nature of the cultural material and in particular the limited quantity of faunal material indicate that this occupation is likely to have been brief and transitory.

The middle stratum was greatly disturbed by the digging of fire scoops, but in at least one part of the excavated area there were "up to six levels of occupation sealed for the most part between layers of water-laid reworked basaltic ash" (ibid.). Correlation of these levels with the 19 layers and subdivisions of layers from which the faunal material in the middle stratum derive is complicated by twenty years of attrition on the available stratigraphic information. However, five occupation levels have been defined through analysis of the material in hand. The bulk of the faunal material was contained in five layers which were separated, for the most part, by layers with little or no faunal material. In the following analysis material from layers adjacent to the major occupation layers have been pooled in the manner outlined in Table 1.

Table 1. Occupation levels at Pig Bay.

Stratum	level	major occupation layer	pooled stratigraphic layers
upper	I	6	1,3,4,5,5a,5b,5c,6,
middle	II	7	7a,7b
	III	8	8a,8b,8c,8d
	IV	10	9,10,10a,11
	V	13	12,13,13b,13c,14
	VI	15	15a,15b,15c
lower	VII	16	16

The upper stratum was composed of nine layers and subdivisions of layers which have been combined into a single occupation level.

Accurate dating of the occupation levels is not possible, but levels II to VII which contain the bulk of the faunal material must lie between the 14th and 17th centuries. The earliest occupation, level VII, postdates the Rangitoto ash shower of the 14th or early 15th century. Charcoal from a hangi cut from the base of level I has been dated to A.D. 1678±40 (N.Z.221, ibid.:571). The presence of an iron file midway through level I (ibid.:576) and cattle bones at its base indicate either a relatively late date for this level or post-European disturbance.

Methods of analysis

Although some of the faunal material had been sorted and identified previously a complete reassessment of the mammalian bone was undertaken. All faunal material was examined, mammalian bone extracted and sorted into dog and sea mammal. Identification to species level, where possible, was undertaken by comparison with specimens housed in the Anthropology Department, University of Otago. The fragmentary nature of much of the cetacean material and inadequacies in the reference sample prevented species identification in some cases.

The minimum numbers of individuals (MNI) represented by each skeletal element were derived from the most frequently occurring portion of that element. The proportional representation of body parts was calculated from this data. The maximum MNI for each species within each occupation level was calculated from the most frequently occurring skeletal element.

Dogs were aged on the basis of epiphyseal fusion and tooth eruption using procedures outlined by Allo (1970, 1971). Tooth wear and dental abnormalities (ibid.) were also assessed. The fragmentary nature of the sea mammal bone prevented any analysis beyond computation of MNI.

Results

The MNI represented in each occupation level are shown in Table 2. Two securely identified species are present; the Polynesian dog, *Canis familiaris*, and the Pilot whale, *Globicephala melaena*. The cetacean bones in levels I and V could not be identified to species, although they are within the size range of the Pilot whale. All of the cetacean bone was in poor condition and only in level VI were more than a few fragments present. The possibility that at least some of the cetacean material in levels I to V derives

Table 2. Minimum numbers of individuals.

Level	dog	pilot whale	cetacean ?sp.	total
I	3		1	4
II	5			5
III	3	1		4
IV	5			5
V	4		1	5
VI	8	1		9
VII	1			1
Total	29	2	2	33

from level VI must be considered. Internal disturbance within the site through the digging of firescoops could account for this. The frequent use of sea mammal bone for artefact manufacture in all levels (Appendix 1) raises the possibility of deliberate mining of earlier occupation levels for suitable bone. Alternatively, industrial bone could have been acquired from the skeletons of naturally stranded animals. Thus the presence of cetaceans in all levels does not necessarily indicate that they were always a source of food at this site.

The same cannot be said for the dogs. Consideration of the proportional representation of skeletal elements (Figs. 1-6) indicates that all body parts were present at all levels, except level VII, which contained only a few teeth and a single vertebra. The relatively small numbers of individuals, and, perhaps more importantly, the numbers of identified elements in each level limit the confidence which can be placed in conclusions about butchering patterns drawn from this data. Furthermore, differential bone survival (cf. Binford & Bertram 1977) and incomplete excavation of the site may have unequally affected the observed pattern of body parts representation. Nevertheless one feature of these assemblages is worthy of closer analysis: the body parts which might be expected to make up the best cuts of meat are under-represented in most levels.

Quantitative data on the amount of meat provided by each body part is not available for the Polynesian dog, nor do we know the procedure generally employed in prehistoric New Zealand for butchering these animals. A brief consideration of typical canine myology (Miller *et al.* 1964: Chapter 3) suggests that the three best cuts would be taken from the upper hindlimbs, the upper forelimbs and from the musculature along the dorsal surface of the vertebral column. The first two of these would be most easily obtained by detaching the meat on the bone. In the case of the hindlimbs, both right and left sides may have been taken as a single cut along with the pelves and sacral vertebrae, or alternatively as two separate units with the rump and sublumbar muscles flensed from the pelves and each limb disarticulated from the axial skeleton at the hip joint. The forelimbs would be easily removed by detaching the scapulae and associated musculature from the thorax.

Detaching the dorsal musculature of the trunk on the bone would be a difficult and laborious task, involving disarticulation of the cranium and ribs from the vertebral column. A more likely procedure, which would yield the bulk of this meat, involves simply flensing the musculature from the neck and back. Once these three cuts had been taken the remainder of the skeleton would provide little meat.

With these considerations in mind, analysis of the representation of body parts in Pig Bay reveals an interesting pattern. All body parts are represented in each level (excluding level VII, which yielded only four identified elements), which indicates that butchering of the dogs took place at the site. The head is the most common body part, providing the maximum MNI in all but one assemblage. Limb bones tend to be under-represented, except in levels I and V, and the trunk of the body varies in its observed presence. Differential bone survival may account for the variable representation of the trunk, as ribs and to a lesser extent vertebrae are difficult to identify in the fragmentary condition in which they usually occur in archaeological sites. However this is an unlikely explanation for the low occurrence of limb bones, as these survive as well as do cranial bones. Allo (1970) has noted that dog limb bones tend to be under-represented in New Zealand archaeological sites, and has suggested industrial use of these bones as a cause. Artefacts

of dog limb bones have been recovered from several sites (e.g. Duff 1956:95, Boileau 1980:72). However there is little direct evidence for industrial use of limb bones at Pig Bay, either in the form of finished artefacts or cut and discarded sections of bone (Appendix 1), and an alternative explanation for their low representation is considered more likely. It is suggested that once these body parts had been detached from the carcass they were frequently taken elsewhere for consumption. Clearly this did not happen all the time as limb bones are present in all assemblages, nevertheless the observed pattern of body parts representation would seem to indicate the sharing of dog carcasses. There is insufficient evidence to determine whether parts of the carcass were simply removed to another part of the same site or taken farther afield before being consumed.

The ages at death of the dogs were assessed by the methods outlined by Allo (1970). Table 3 presents the results of this analysis. Only 55% of the identified individuals were able to be aged as the major limb bones, essential for establishing age by epiphyseal fusion, were frequently not present. The more frequently represented mandibles are useful for accurate ageing only up to the completion of tooth eruption at about seven months. This has prohibited any meaningful interpretation of patterns in the age at death of dogs in this site.

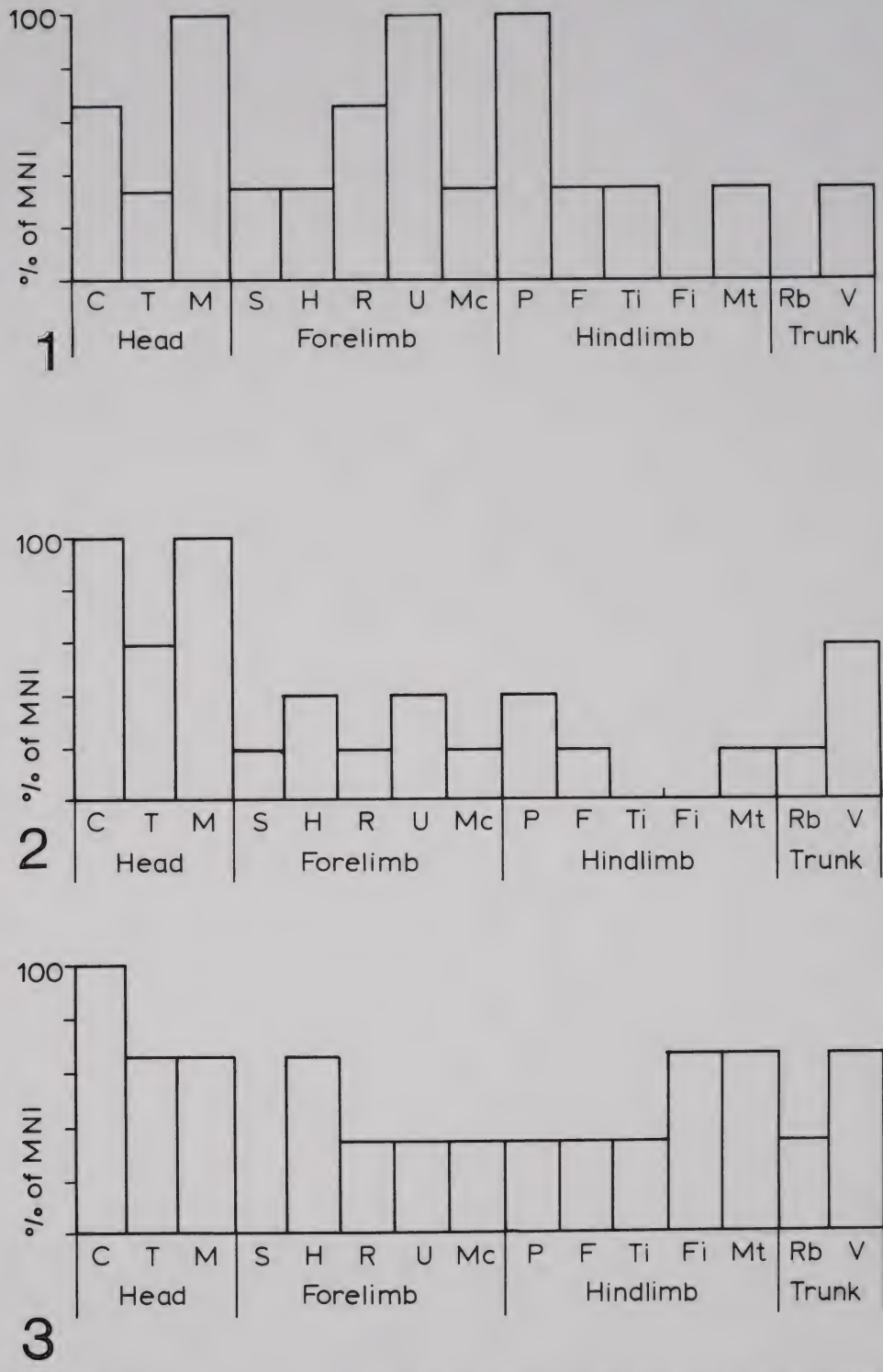
The degree of tooth wear, measured on a scale from zero to five (Allo 1971:37) is summarised in Table 4. These results are similar to those obtained by Allo for the North Island Archaic sites of Houhora (N6/4) and Whangamata (N49/2) (ibid.:Table 4). The

Table 3. Ages of dogs at death.

Level	juvenile ⟨7 months	subadult 7-18 mths	adult ⟩18 mths	no indication	total
I	1		1	1	3
II	2	1	1	1	5
III			1	2	3
IV			1	4	5
V		2		2	4
VI	2	2	2	2	8
VII				1	1
Total	5	5	6	13	29

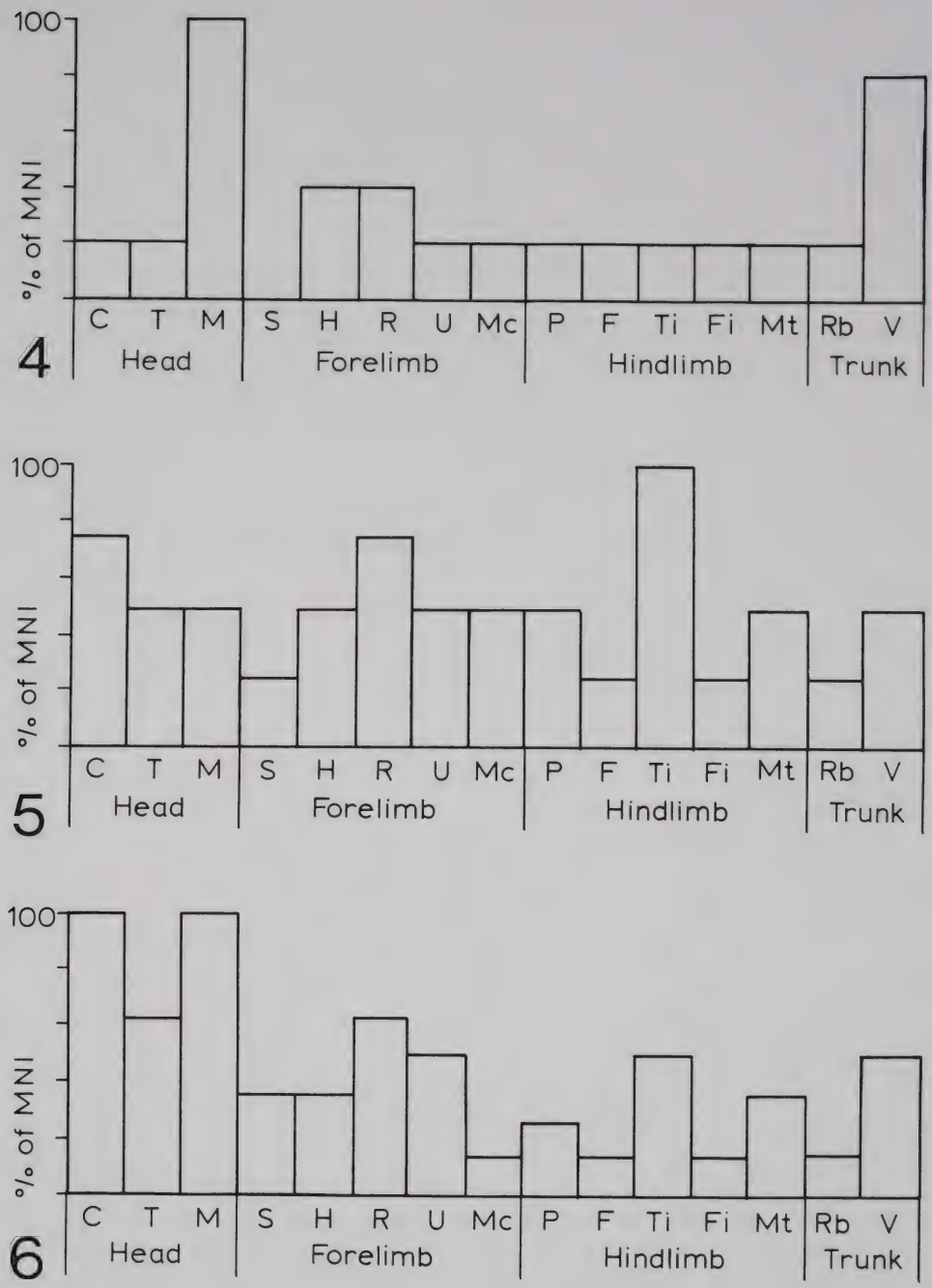
Table 4. Tooth wear in dogs.

Level	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
I				2						
II		1		1	1		1			
III					1	1				
IV					2	1				
V				1			1			
VI	2		1	2		1	1	1		
Total	2	1	1	6	4	3	3	1	0	0



Figs. 1-3. Proportional representation of dog body parts. 1. Pig Bay level I. Maximum MNI = 3. Number of identified elements = 62. 2. Pig Bay, level II. Maximum MNI = 5. Number of identified elements = 89. 3. Pig Bay level III. Maximum MNI = 3. Number of identified elements = 86.

C—cranium, T—teeth, M—mandible, S—scapula, H—humerus, R—radius, U—ulna, Mc—metacarpus, P—pelvis, F—femur, Ti—tibia, Fi—fibula, Mt—metatarsus, Rb—rib, V—vertebra.



Figs. 4-6. Proportional representation of dog body parts. 4. Pig Bay level IV. Maximum MNI = 5. Number of identified elements = 40. 5. Pig Bay level V. Maximum MNI = 4. Number of identified elements = 83. 6. Pig Bay level VI. Maximum MNI = 8. Number of identified elements = 130.

range of wear ratings, from 0.5 to 4.0, is identical, with the bulk of the specimens in each case falling in the middle of this range. The Pig Bay results corroborate Allo's finding that extreme wear is not observed in North Island sites.

Seven incidences of dental abnormalities were observed (Table 5). All of these were found in the mandibular dentition. The most commonly occurring abnormalities in Allo's study, supernumerary alveoli, were not observed at Pig Bay. The two examples of single rooted premolars are matched in Allo's study by a single example of each; one from Houhora, and one from Whangamata. Absence of the third mandibular molar has not been observed previously in North Island sites. Premortem tooth loss appears to have been rare, and more frequent in South Island sites (ibid.:38). Recession of the alveolar bone due to periodontal disease has been recorded previously only in the South Island. The two examples in Pig Bay both involved considerable alveolar recession and premortem tooth loss and were clearly the result of periodontal disease.

Table 5. Dental abnormalities in dog mandibles.

Level	single rooted premolar P3	P4	absence M3	premortem tooth loss	recession of alveolar bone
I	1				
II			1	1 (P2)	
III		1			
IV				1 (P2)	
VI				2 (M1, P4)*	2

* tooth loss due to periodontal disease

Discussion

Until analysis of the non-mammalian fauna from Pig Bay has been completed it is not possible to fully understand the patterns of resource utilisation and economic activity at the site. However the present analysis does permit some tentative conclusions to be drawn. Firstly, dogs were a major food source throughout the occupation of the site. They occur in all levels, and only in the earliest occupation are fewer than three individuals represented. With the exception of cetaceans, whose remains are few and may not necessarily result from exploitation for food, they comprise the whole of the mammalian fauna. Fur seals and sea lions are absent, and moa bone is rare and probably industrial (Davidson pers. comm.). The remaining fauna includes fish, shellfish and birds. Thus dogs are the largest animals occurring in the midden and are likely to have made up a significant proportion of the diet. An identical pattern has been observed in contemporary levels of the Sunde site, where dogs were the only mammal, moas were not exploited for food, and a similar range of species made up the remainder of the fauna (Scott 1970).

The absence of seals is one of the most striking features of this site when compared to assemblages from adjacent coastal areas. In contemporary middens on the Coromandel (e.g. Allo 1972, Smith 1978, 1981) fur seals occur regularly, sometimes in equal numbers to dogs, and generally they contribute a greater weight of meat than do dogs. The somewhat earlier site of Houhora in Northland also contains large numbers of fur seals (Shawcross 1972, Smith n.d.). The presence of both fur seals (Scott 1970) and sea lions

(Smith n.d.) beneath the Rangitoto ash in the Sunde site indicates that both these species were present and exploited in the Hauraki Gulf prior to the 14th or 15th century. Their absence in later sites may indicate localised extinction, or alternatively that the sites were occupied at a time of year during which seals were not present in the area. At present there is insufficient evidence to properly evaluate these two hypotheses.

There is a suggestion in the Pig Bay evidence that the exploitation of dogs may have declined through time. The greatest number of individuals occur in level VI. In the succeeding levels numbers fluctuate, but never reach the proportions observed earlier. A similar pattern of declining numbers through time is apparent in the Sunde site (Scott 1970), although the extent to which this indicates reduced exploitation rather than reflecting the general decline in quantity of faunal material cannot be ascertained.

Perhaps the most revealing results of this study concern the dog butchering patterns. It was argued above that the proportional representation of body parts observed in most levels of Pig Bay indicated the sharing of butchered dog carcasses. Archaeological evidence for this practice has not previously been recorded in New Zealand.

Documentary evidence of dog butchering and the sharing of carcasses in the protohistoric period is rare. George Forster (in Titcomb 1969:42) mentions eating roasted leg of dog, which provides some confirmation of the suggested method of butchering, and Beattie (1939:130) refers to dog carcasses as an item of exchange although he does not indicate whether they were whole or butchered. The absence of detailed accounts of dog butchering and sharing and their social corollaries in the protohistoric, and the time difference between the pre- and protohistoric periods make it difficult to determine the cultural importance of the Pig Bay evidence. Nevertheless it is reasonable to assume that the evident distribution of butchered dog carcasses indicates a social relationship mediated by food sharing or exchange between the people at Pig Bay and some others. Elucidation of the nature of this relationship and its cultural importance must await further evidence.

Conclusion

The mammalian fauna from Pig Bay is remarkably limited in range of species when compared to contemporary coastal sites in New Zealand. The reliance on sea mammal hunting as well as moa hunting observed in so many coastal Archaic sites is absent here, suggesting a somewhat different economic adaptation in this region. Although the non-mammalian fauna has not yet been analysed it would appear that the food quest centred around fishing and shellfishing. Horticulture may well have played an important role in the economy. Throughout the occupation of the site dogs were an important dietary component. The apparent scarcity of other mammalian food resources may have accounted for the sharing of butchered dog carcasses observed in the site.

Acknowledgements. I am indebted to Janet Davidson, then Archaeologist at the Auckland Museum, who made this material available for study, provided invaluable background information and commented on the manuscript, and Roger Fyfe (Taranaki Museum) for discussions on butchering methods.

APPENDIX 1: *WORKED BONE FROM PIG BAY*

Acc.No.	Layer	Level	Description	Identification
2038	4	I	fish hook lure (broken)	sea mammal ?sp.
2052	5b	I	fish hook lure	sea mammal ?sp.
2042	7a	II	fish hook lure	sea mammal ?sp.
2047	8	III	fish hook (broken)	sea mammal ?sp.
2048	8	III	unfinished lure	?dog tibia
1860	8b	III	drilled tooth	fur seal
962	8b	III	fish hook tab	?moa
2053	8a/8c	III	fish hook (broken)	sea mammal ?sp.
2033	8c	III	barbed bone point	dog tibia
2035	8c	III	bone point (broken)	?dog
2043	8c	III	fish hook (broken)	sea mammal ?sp.
2044	8c	III	fish hook (broken)	cetacean ?sp.
2045	8c	III	fish hook (broken)	sea mammal ?sp.
2046	8c	III	lure (broken)	sea mammal ?sp.
2034	8disturb.	III	?	sea mammal ?sp.
2113	12	V	fish hook (broken)	sea mammal ?sp.
2114	12	V	fish hook tab	sea mammal ?sp.
2115	12	V	?	?moa
590	13	V	fish hook (broken)	sea mammal ?sp.
1662	13	V	?	cetacean ?sp.
2037	13b	V	fish hook (broken)	sea mammal ?sp.
888	13b	V	?	cetacean ?sp.
963	13c	V	?	moa
2036	13c	V	fish hook (broken)	sea mammal ?sp.
907	14	V	?	?dog
2031	14	V	needle (broken)	?bird
803	15a	VI	?	cetacean ?sp.
908	15a	VI	?	?
1841	15a	VI	?	?dog
2040	15a	VI	fish hook (broken)	sea mammal ?sp.
2041	15a	VI	fish hook tab (broken)	sea mammal ?sp.
2049	15a	VI	fish hook broken	sea mammal ?sp.
2050	15a	VI	fish hook (broken)	sea mammal ?sp.
2051	15a	VI	fish hook tab (broken)	sea mammal ?sp.
2054	15a	VI	fish hook (broken)	sea mammal ?sp.
2111	15a	VI	lure	sea mammal ?sp.
2055	15b	VI	fish hook	sea mammal ?sp.
2056	15b	VI	fish hook (broken)	sea mammal ?sp.
2112	16	VII	fish hook (broken)	sea mammal ?sp.
. . . . unprovenanced			3 fish hooks (broken)	sea mammal ?sp.

REFERENCES

ALLO, J.

1970 The Maori Dog: a study of the Polynesian Dog of New Zealand. Unpublished M.A. Thesis, University of Auckland.

1971 The dentition of the Maori dog of New Zealand. *Rec. Auckland Inst. Mus.* 8:29-45.

1972 The Whangamata Wharf site (N49/2): excavations on a Coromandel coastal midden. *Rec. Auckland Inst. Mus.* 9:61-79

BEATTIE, J.H.
1939 *Tikao talks: traditions and tales told by Teone Taare Tikao to Herries Beattie*. A.H. & A.W. Reed, Wellington. 163p.

BINFORD, L.R., and J.B. BERTRAM
1977 Bone frequencies and attritional processes. *In* L.R. Binford (Editor), *For Theory Building in Archaeology*. Academic Press, New York. 419p., pp.77-153.

BOILEAU, J.
1980 The artefact assemblage from the Opito Beach midden, N40/3, Coromandel Peninsula. *Rec. Auckland Inst. Mus.* 17: 65-95.

BROTHERS, R.D., and J. GOLSON
1959 Geological and archaeological interpretation of a section in Rangitoto ash on Motutapu Island, Auckland. *N.Z. J. Geol. Geophys.* 2(3): 569-577.

DAVIDSON, J.M.
1974 Radiocarbon dates from the Sunde site (N38/24), Motutapu Island, New Zealand. *Rec. Auckland Inst. Mus.* 11: 9-10.
1978 Auckland prehistory: a review. *Rec. Auckland Inst. Mus.* 15: 1-14.

DUFF, R.
1956 *The Moa-hunter Period of Maori Culture*. 2nd ed. Government Printer, Wellington.

GOLSON, J.
1959 Culture change in prehistoric New Zealand. *In* J.D. Freeman and W.R. Geddes (Editors), *Anthropology in the South Seas . . .* Thomas Avery, New Plymouth. 267p. pp.29-74.

GOLSON, J., and R.N. BROTHERS
1959 Excavations at Motutapu. *N.Z. Archaeol. Ass. Newsl.* 2(2): 5-8.

LAW, R.G.
1975 Radiocarbon dates for Rangitoto and Motutapu, a consideration of the dating accuracy. *N.Z. J. Sci.* 18: 441-451.

MILLER, M.E., G.C. CHRISTENSEN, and H.E. EVANS
1964 *Anatomy of the Dog*. W.B. Saunders, Philadelphia. 941p.

SCOTT, S.D.
1970 Excavations at the "Sunde site", N38/24, Motutapu Island, New Zealand. *Rec. Auckland Inst. Mus.* 7: 13-30.

SHAWCROSS, F.W.
1972 Energy and ecology: thermodynamic models in archaeology. *In* D.L. Clarke (Editor), *Models in Archaeology*. Methuen, London. 1055p. pp.577-622.

SMITH, I.W.G.
1978 Seasonal sea mammal exploitation and butchering patterns in an Archaic site (Tairua, N44/2) on the Coromandel Peninsula. *Rec. Auckland Inst. Mus.* 15: 17-26.
1981 Prehistoric mammalian fauna from the Coromandel Peninsula. *Rec. Auckland Inst. Mus.* 18: 107-125.
n.d. Sea mammals and prehistoric subsistence in New Zealand. (in preparation) PhD thesis, University of Otago.

SULLIVAN, A.
1975 Radiocarbon ages from Wiri (N42/24). *N.Z. Archaeol. Ass. Newsl.* 18(4): 206-207.

TITCOMB, M.
1969 *Dog and man in the ancient Pacific*. B.P. Bishop Museum Special Publication 59.

PREHISTORIC MAMMALIAN FAUNA FROM THE COROMANDEL PENINSULA

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Abstract. Mammalian fauna from excavations at Opito (N40/3), Sarahs Gully (N40/9) and five nearby sites is described and aspects of prehistoric economy reconstructed. Dogs were the most abundant and consistently occurring species, but throughout the period A.D. 1200-1500 sea mammals contributed a greater quantity of meat to the diet. Comparisons with several contemporary North Island sites show similar patterns and suggest a decline in sea mammal exploitation after the 15th or 16th century.

One of the most concerted and fruitful periods of archaeological research on the Coromandel Peninsula, North Island, New Zealand, took place between 1956 and 1960. Excavations were concentrated on a group of sites just to the north of Mercury Bay (Fig. 1), and yielded a body of data of considerable importance in developing the understanding of early Polynesian occupation in the North Island. These excavations were, among other things, central to Golson's defining of Archaic material culture in the North Island (Golson 1959b), and to the eventual acceptance of horticulture as within the range of Archaic economic pursuits (Green 1972a, 1972b).

The sites fall into two broad types; beach middens, and sites with kumara storage pits. The excavated sites and others in the vicinity appear to form a consistent distributional pattern, with the pit complexes located on low ridges immediately behind the coastal middens. The two site types are generally thought to be related components of a single settlement pattern (Green 1972b). The economic activities of their inhabitants seem to have been wide ranging. The growing of kumara, and perhaps other cultigens, is indicated by the storage structures, and the associated middens are reported to have contained a wide range of both extinct and extant fauna (Green 1963, Davidson 1979). However, the faunal material from most of these sites has received little more than the most cursory examination. Thus it has not been possible to document accurately the range of economic activities undertaken and their relative importance. In this paper the mammalian fauna from these sites is analysed with a view to clarifying at least part of the economic system of the prehistoric inhabitants of this area. The material under analysis derives from several excavations (described below) and is now housed in the Auckland Museum.

THE ASSEMBLAGES

Analysis of faunal remains excavated some twenty years ago presents problems above and beyond those normally encountered in the study of prehistoric economies. Records of some of these excavations are now incomplete and thus the interpretation of stratigraphy is difficult. The major problem arising in this study concerns the pooling of faunal material into assemblages that can reasonably be expected to represent discrete periods of occupation. For some of the sites this is not difficult, as sufficient stratigraphic

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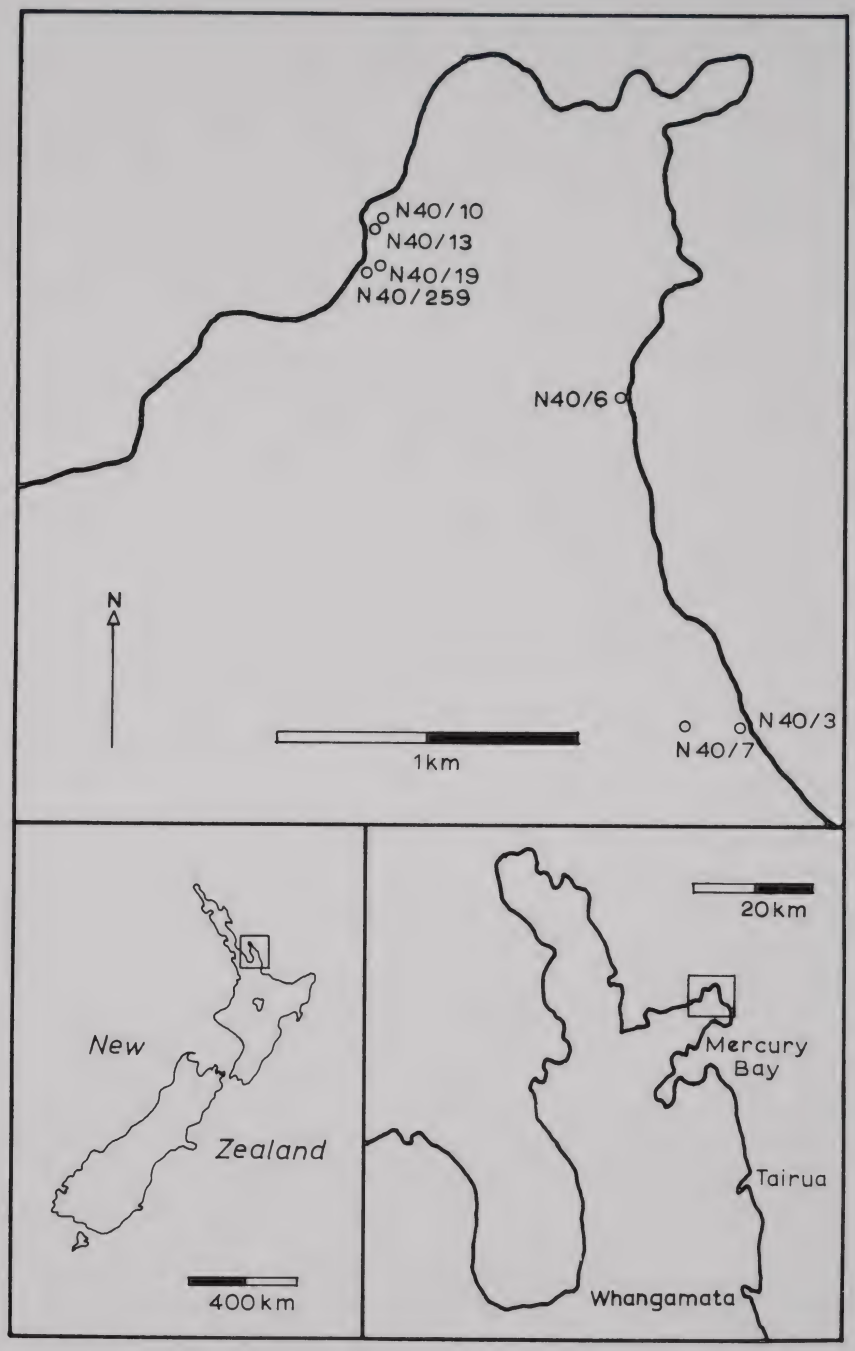


Fig. 1. Location of sites.

information is available. For others this is not so, and the following interpretations employ the information that is available combined with some estimation. The assemblages under analysis are summarised as follows.

Opito (N40/3)

This site was excavated in 1957-58 by Golson (1959a, 1959b). The material under analysis derives from seven layers which have been combined into four occupation levels. Level I is composed of layers 2 and 3, which represent the latest period of occupation at the site (Green 1963:59). Mammalian fauna was present only in layer 3.

Layer 4 is subdivided into three deposits — 4a, 4b and 4c — which together are assigned to the Archaic period (Golson 1959a: 18). Each of these has been treated as a separate level. An argument could be made for combining layers 4a and 4b, as during the process of identifying bone from these layers part of a broken dog pelvis from 4a was found to connect with a portion from 4b, raising the possibility of continuity of occupation between the two layers. Furthermore Green (1964), in his study of Coromandel obsidians, combined 4a and 4b although his reasons for doing so were not made clear. However, as recent analyses of other site components have treated these layers as discrete assemblages (e.g. Boileau 1980), and as the observed bone matching could be accounted for by intra-site disturbance, each of these layers will be treated separately.

Layers 5, 6 and 7 must be assumed to lie beneath layer 4, although they are not described in any of the published accounts of the stratigraphy. As these contained very little material, and as layer 4c was described as an occupation "spread at the bottom of the deposit" (Green 1963:60), the lower layers have been included with 4c in level IV.

The pooling of layers into occupation levels is summarised as follows:
Level I — Layers 2 and 3
Level II — layer 4a
Level III — layer 4b
Level IV — layers 4c, 5, 6 and 7.

Arthur Black's Midden (N40/6), Opito

Little is known of investigations in this site, undertaken in 1958 (Golson 1959a). The stratigraphy has not been described, but as faunal material from two layers was present, each was treated as a separate assemblage.

Skippers Ridge (N40/7), Opito

Parker's excavations at Skippers Ridge have been described in detail elsewhere (Parker 1960, Davidson 1975). The five layers of this complex site have previously been grouped into four occupation levels (Davidson 1975: Table 1). The faunal material under analysis here derives from layer 2 (Occupation IV) and layer 4 (Occupation I). Further mammalian bone was reported from layer 3 (Occupation III) (Parker 1960:41) but was not present in the collection analysed here.

Sarahs Gully Settlement (N40/9)

Excavations undertaken by Golson between 1956 and 1959 (Golson 1959a) concentrated on a number of areas within this large site. These will be analysed separately.

a. *Areas A and B*. These two contiguous areas on the edge of a terrace behind the beach had up to ten stratified layers (Green 1963:65). There is no direct evidence which permits pooling of these layers into occupation levels, although a change of emphasis from rocky shore to mudflat shellfish species between the lower five and upper five layers (ibid.) does suggest that the sequence could be divided into two broad periods. The distribution of cetacean bone, both horizontally and vertically within the site provides a further possible basis for pooling. All the cetacean bones appear to be from a single species, the pilot whale *(Globicephala melaena),* and fall into three concentrations within the site. A few small cranial and vertebral fragments occurred in layers 1, 2 and 3, and were all concentrated within three adjacent squares near the middle of the excavated area. On the seaward edge of the midden a concentration of rib bones was found in layers 6 and 7, and a concentration of cranial bones in layer 9. The relative scarcity of bones of this species in the site and their apparent spatial proximity suggests that each concentration represents bones of a single individual. Whether their distribution through a number of layers indicates that these layers belong to a single period of occupation, or results from internal disturbance of the stratigraphy cannot be established. In either case the pooling of these sets of layers would appear to be a wise procedure. On this basis the material has been grouped into four levels as follows:
Level I — layers 1, 2 and 3
Level II — layers 4 and 5
Level III — layers 6 and 7
Level IV — layers 8, and 9 and natural.

b. *Area C*. Five layers were present in this area, but only the lower three contained mammalian fauna. Each has been treated as a separate assemblage.

c. *Area D*. Material from the surface and four underlying layers was present and each has been analysed separately.

Cross Creek Midden (N40/259)

During excavations at Sarahs Gully, material was collected from this midden across the stream from the main site (Davidson pers. comm.). As it was not excavated by stratigraphic techniques the material will be treated as a single assemblage.

Sarahs Gully Pa (N40/10)

Excavations at this site in 1959 and 1960 were directed by L. and H. Birks. Three periods of occupation have been identified (Birks & Birks 1960), but unfortunately the material under analysis, from layers 2, 3 and 4, could not be correlated with these. Each layer was examined separately.

Sarahs Midden (N40/13)

Sarahs Midden was excavated during the course of investigations at Sarahs Gully Pa. Two distinct occupation levels are reported from this site (Green 1963:67). The material under analysis derives from layers 2, 3, 4 and 5. Of these layers 3 and 5 contained the bulk of the faunal material and have been interpreted as the occupation levels referred to above.

The material from the other two layers — three bone fragments from layer 2, and two from layer 4 — has been combined with that from the primary layers in the following manner:
Level I — layers 2 and 3.
Level II — layers 4 and 5.

DATING OF THE ASSEMBLAGES

Radiocarbon dates are available for only four of the sites, and for only some of the levels within each of these. Summaries of these dates may be found elsewhere (Green 1963, 1972b, Davidson 1974). The absence of radiocarbon estimates for many of the assemblages and problems of interpretation of some of the available dates prohibit construction of a detailed relative chronology. However, with the exception of three or four assemblages, all the material appears to derive from the period A.D. 1200-1500. The earliest secure date — A.D. 1170+ 60-50 (N.Z. 1740; Davidson 1974) — is for Occupation I at Skippers Ridge. A slightly earlier date from Area A at Sarahs Gully is considered unreliable as the sample may have consisted of old wood (Green 1963:66). Phase I at Sarahs Gully Pa is dated to the mid-13th century, and Sarahs Gully Settlement and level IV at Opito to the 14th century (ibid.:60-66). Although not dated, the Cross Creek Midden, Blacks Midden, levels II and III at Opito, and level II at Sarahs Midden are also likely to fall within this period. Phases II and III at Sarahs Gully Pa are dated to the 16th and 17th centuries respectively. Occupation IV at Skippers Ridge and Level I at Opito may also be of this age. The end of the sequence is marked by level I at Sarahs Midden, which contained evidence of European contact (ibid.:67).

METHODS OF ANALYSIS

A number of the assemblages had been sorted into major faunal components and the material partially identified prior to this analysis. To maintain a comparable standard of faunal analysis all material, whether sorted and identified or not, was subjected to the same treatment.

All bone material was examined and mammalian fauna, other than rat, extracted. This was then sorted into four major categories — dog, seal, cetacean, and unidentifiable mammalian bone. Identification to species level (where possible) was undertaken by comparison with reference specimens in the Anthropology Department, University of Otago. The fragmentary nature of much of the cetacean bone, inadequacies in the available reference sample, and close osteological similarities between species prevented accurate identification of much of the cetacean material. The material was then identified to skeletal element, side of the body (where relevant), and portion of the bone present. The minimum number of individuals (MNI) for each species in each assemblage was calculated from the most frequently occurring skeletal element. Proportional body parts representation (BPR) was determined from the relative frequency of each skeletal element.

The ages of dogs were estimated from tooth eruption and epiphyseal fusion following the methods outlined by Allo (1970). Age and sex in fur seals were estimated from epiphyseal fusion and bone dimensions (Smith n.d.). Tooth wear and dental abnormalities in dogs were also assessed, using the methods described by Allo (1971).

In order to establish the relative importance of mammalian species in the economy the weight of meat provided by each animal was calculated. This was undertaken only for those assemblages with sufficiently large numbers to make comparisons meaningful. The basis for these calculations is discussed more fully elsewhere (Smith n.d.), but will be summarised briefly here. The average live body weights, estimated available meat weights and meat weights of various body parts for the relevant age and sex related groups in the species under consideration are listed in Table 1. For most species there was no indication of the age and sex of some individuals, and weights mid-way through the size range were employed for these. The unidentifiable cetaceans appeared to be of a similar size to the identified pilot whales, and the figures for that species have been applied to all the cetaceans. Analysis of the fur seal *(Arctocephalus forsteri)* BPR indicated that in some assemblages various individuals were represented by only part of the carcass. Hence meat weights were calculated only for those body parts present. The elephant seal *(Mirounga leonina)* and cetacean remains also appeared to represent partial carcasses, although problems of identification prevented establishing which body parts were present. In these instances an arbitrary figure of 10% of the available meat weight was employed to represent the weight of meat consumed. While such a procedure is clearly less than desirable, it can be justified on a number of grounds. The limited quantity of bone by which each of these species is represented suggests strongly that complete carcasses were not consumed, and thus employing complete carcass weights would grossly over-represent their economic importance. Individuals of both these species are very large — an adult pilot whale weighing approximately 1360 kg, and a subadult male elephant seal about 500 kg — and in the event of their capture disposal of a carcass before it rotted is likely to have presented problems to a small group of people. The sharing of meat with neighbouring or related groups of people may well have occurred in such situations, and

Table 1. Body weights and meat weights of selected mammals.

Species/age group	body weight	meat weight	meat weight (kg)	
	(kg)	(kg)	forelimb	hindlimb
Dog *(Canis familiaris)*				
juvenile	5.0	3.0		
subadult	10.0	6.0		
adult	12.5	7.5		
no indication	10.0	6.0		
Fur seal *(Arctocephalus forsteri)*				
pup	8.6	4.82		
juvenile	25.0	14.38	2.16	
subadult male	100.0	59.00	8.85	5.90
adult female	50.0	30.00	4.50	
adult male	150.0	94.50	14.18	9.45
no indication	75.0	44.25	6.64	
Elephant seal *(Mirounga leonina)*				
subadult male	500.0	276.25		
Sea lion *(Phocarctus hookeri)*				
adult male	225.0	141.75		
Pilot whale *(Globicephala melaena)*				
no indication	1360.0	829.60		

for this reason a partial carcass weight is to be preferred. An alternative means of prolonging the usefulness of a large animal carcass would have been through drying or some other means of preservation. It is not possible to determine whether such practices were undertaken at these sites, and thus the partial carcass weights may under-represent the true dietary value of these species.

RESULTS

Minimum numbers of individuals

The minimum number of individuals represented in each assemblage is shown in Table 2. The polynesian dog, *Canis familiaris,* was the most common species, occurring in every assemblage and making up just over half (55.44%) of the identified individuals. A quarter (25.74%) of the animals were fur seals. These were present in about half of the 25 assemblages. Cetaceans occurred in a greater number of assemblages, but made up a smaller total number of individuals as there was never more than one per assemblage. In only six instances was it possible to identify the cetaceans to species. The individual from Opito level IV, the three from Areas A and B at Sarahs Gully, and those from Sarahs Gully C layer 3 and Sarahs Gully D layer 3 were all Pilot whales. The remaining cetaceans were represented by remains too few and fragmentary to permit accurate identification. The two remaining species were extremely rare. A single New Zealand sea lion *(Phocarctus hookeri)* occurred in level II of Sarahs Midden, and elephant seal remains were found in four assemblages.

Dogs

The ages at death of dogs are shown in Table 3. Only 55% of the identified individuals were able to be aged, as the major limb bones essential for establishing age by epiphyseal fusion were frequently incomplete or absent. This reduces the confidence which can be placed in any conclusions drawn from these results, however there is a strong indication that dogs most frequently killed before reaching maturity. Just over one quarter of the aged dogs were adult (〉18 months), with the two immature age groups making up 72.41%. This figure is considerably greater than the 20-40% of immature dogs which Allo found in North Island Archaic sites (Allo 1971: 121), but with nearly half of the identified individuals unaged it would be unwise to read too much into this difference. Nevertheless these results do support Allo's conclusion that killing immature dogs was relatively more common during the Archaic period than it was later.

The study of tooth wear (Table 4) also supports Allo's findings, confirming the absence of extreme wear in North Island Archaic dogs (ibid.:123). The range of wear observed is almost identical to that recorded by Allo for the Whangamata Wharf site (N49/2) and Houhora (N6/4), and Smith for Pig Bay (N38/21) (Allo 1971: Table 4, Smith 1981: Table 4).

Two incidences of abnormalities in the dentition of dogs were observed. Both were found on individuals in level III at Opito, and occurred in the mandibular dentition. One involved a supernumerary P1 alveolus, and the other a supernumerary M3 alveolus. Both of these have been recorded previously in the Maori dog (Allo 1971:Table 7). Two further recorded incidences of abnormality from this group of sites — a supernumerary P1 alveolus from Sarahs Gully, and premortem loss of a right mandibular P4 at Opito (ibid.:Table 7, Table 5) — were not able to be located in the material under study.

Table 2. Minimum numbers of individuals.

Assemblage	dog	fur seal	cetacean	elephant seal	sea lion	total
Opito						
level I	1	1	1			3
level II	4	2	1			7
level III	5	5		1		11
level IV	9	9	1	1		20
Total	19	17	3	2		41
Blacks midden						
layer 2	1	1	1			3
layer 3	2	1				3
Total	3	2	1			6
Skippers Ridge						
occ. 1V	1			1		2
occ. I	1					1
Total	2			1		3
Sarahs Gully A&B						
level I	2		1			3
level II	1					1
level III	3		1			4
level IV	2		1			3
Total	8		3			11
Sarahs Gully C						
layer 3	1		1			2
layer 4	2	1	1			4
layer 5	2	1	1			4
Total	5	2	3			10
Sarahs Gully D						
surface	1	1	1			3
layer 1	1					1
layer 2	1					1
layer 3	1		1			2
layer 4	2	1		1		4
Total	6	2	2	1		11
Cross Creek Midden						
Total	8	2	1			11
Sarahs Gully Pa						
layer 2	1					1
layer 3	1		1			2
layer 4	1					1
Total	3		1			4
Sarahs Midden						
level I	1					1
level II	1	1			1	3
Total	2	1			1	4

Table 3. Age of dogs at death.

Assemblage	juvenile	subadult	adult	no indication	total
Opito					
level I				1	1
level II		1	2	1	4
level III	1		1	3	5
level IV	1	2	2	4	9
Total	2	3	5	9	19
Blacks Midden					
layer 2		1			1
layer 3		1	1		2
Total		2	1		3
Skippers Ridge					
Occ. IV				1	1
Occ. I				1	1
Total				2	2
Sarahs Gully A&B					
level I		1		1	2
level II				1	1
level III		2		1	3
level IV	1	1			2
Total	1	4		3	8
Sarahs Gully C					
layer 3		1			1
layer 4	1			1	2
layer 5		1		1	2
Total	1	2		2	5
Sarahs Gully D					
surface				1	1
layer 1				1	1
layer 2				1	1
layer 3				1	1
layer 4		1		1	2
Total		1		5	6
Cross Creek Midden					
Total	3	1	1	3	8
Sarahs Gully Pa					
layer 2			1		1
layer 3	1				1
layer 4				1	1
Total	1		1	1	3
Sarahs Midden					
level I			1		1
level II				1	1
Total			1	1	2

Table 4. Tooth wear in dogs.

Assemblage	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Opito										
level I			1							
level II				1						
level III				2	1	1	1			
level IV			1	2		1	2	1		
Skippers Ridge										
occ. IV			1							
Sarahs Gully A&B										
level I				1						
level III			1		2					
level IV		1		1						
Sarahs Gully C										
layer 3					1					
layer 4				1						
layer 5				1	1					
Sarahs Gully D										
surface							1			
layer 1							1			
layer 3						1				
layer 4			1							
Cross Creek Midden										
		1	1	2	1	1	1	1		
Sarahs Gully Pa										
layer 2			1							
layer 3				1						
Sarahs Midden										
level I				1						
level II				1						

Sea mammals

The placing of fur seals into age-sex groups (Table 5) was more successful than the ageing of dogs. Only 15% were not able to be categorised. Once again an emphasis on subadult age groups was apparent, with 75% of the aged individuals belonging to the pup, juvenile and subadult male groups. The latter two were most common.

A wide range of age-sex groups were found only in levels III and IV at Opito. The presence of an adult female and a foetal pup in level III indicate that there may have been a fur seal breeding colony in the vicinity of the site, as these two age-sex groups are seldom found far from such colonies (Smith 1976: 16,17). The absence of pups and females in any of the other assemblages does raise the possibility that their occurrence at Opito may have resulted from the isolated straying of a pregnant female beyond the normal breeding

Table 5. Age and sex of fur seals.

Assemblage	pup	juv.	subad.male	ad.female	ad.male	no indic.	total
Opito							
level I						1	1
level II		1	1				2
level III	1	1	1	1		1	5
level IV		2	4		3		9
Total	1	4	6	1	3	2	17
Blacks Midden							
layer 2		1					1
layer 3			1				1
Total		1	1				2
Sarahs Gully C							
layer 4						1	1
layer 5		1					1
Total		1				1	2
Sarahs Gully D							
surface						1	1
layer 4		1					1
Total		1				1	2
Cross Creek Midden							
Total			1		1		2
Sarahs Midden							
level II		1					1
Total		1					1

range. However, pups have also been identified from Tairua (N44/2), some 35 km to the south of Opito (Smith 1978:22), which strengthens the case for fur seals breeding in the Coromandel area during the prehistoric period. The rarity of pups and females in the remaining assemblages may have resulted from a non-breeding colony (at which these two groups seldom occur) being located closer to the sites than the postulated breeding colony.

The single sea lion was an adult male, and the four elephant seals were all subadult males.

Determining the season of year at which fur seals were hunted from their population composition in archaeological sites (Smith 1976: 13-19) is complicated by the hypothesised changes in breeding distribution during the prehistoric period. Seasonal changes in present day fur seal colony population composition result from the migration of adult and subadult males from the breeding range in the south to feeding stations in the north (Wilson 1974:Chapter 6). If, as postulated here and elsewhere (Smith 1978:23, 24),

the breeding range formerly extended to the Coromandel Peninsula and perhaps farther north, then this migration pattern may not have occurred. Thus it would not be wise to assume that the season of prehistoric fur seal exploitation can be determined from present day patterns of population composition.

The only assemblage for which the fur seals offer any clear suggestion of seasonality is level III at Opito. The bones of the foetal pup were almost identical in size to those of a foetal specimen (CZ2208) which was miscarried in late September. A late winter or early spring season for this occupation is also indicated by the presence of a subadult male elephant seal. This species is most common in New Zealand waters during the winter (Gaskin 1972:149). Elephant seals were also found in level IV at Opito, occupation IV at Skippers Ridge, and Sarahs Gully D layer 4. Winter occupation for level II of Sarahs Midden is suggested by the presence of a sea lion, also most common in New Zealand waters at that time of year (ibid.:155).

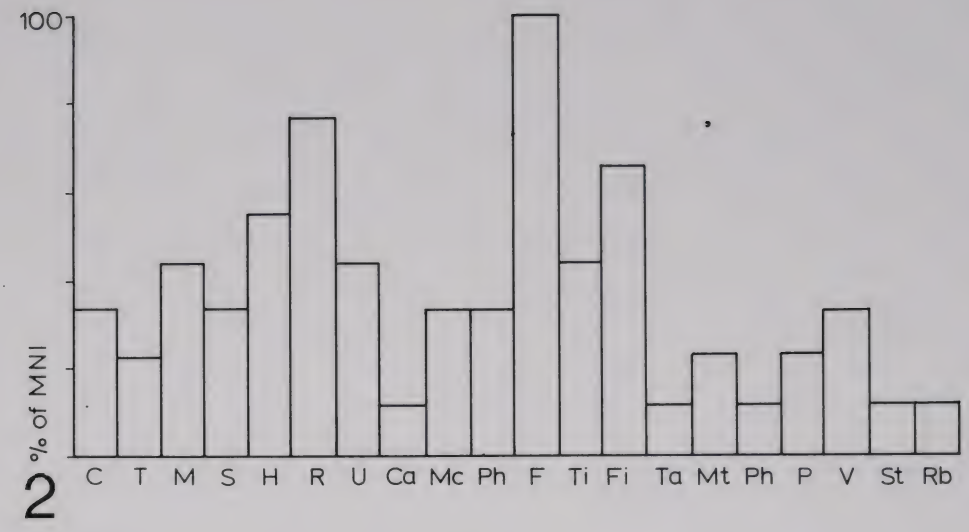
Body parts representation

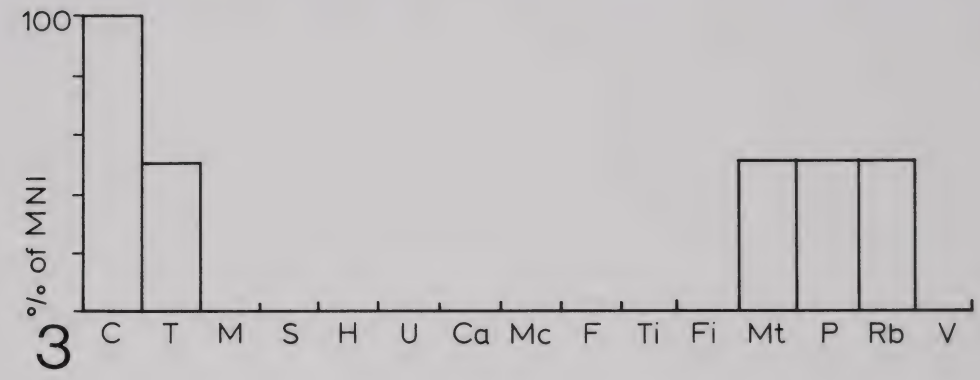
The proportional representation of body parts (BPR) in the larger assemblages under analysis suggests that complete animal carcasses were not always brought to the site for consumption. In five assemblages the fur seal remains show a marked concentration on the body parts yielding the greatest amount of meat. The BPR in Opito level IV (Fig. 2) shows that the upper hindlimb and upper forelimb are best represented. These body parts yield a large proportion of the meat in a fur seal carcass, while those least well represented — the lower limbs and trunk — yield the least (Smith 1978:20). While differential bone survival (cf. Binford & Bertram 1977) and incomplete excavation of the site may have influenced the observed BPR, the most likely explanation for this pattern is that most of the fur seal carcasses brought to the site were incomplete, with the body parts yielding little meat generally being discarded at the butchering site. There is a suggestion in the material from this assemblage that fur seal butchering methods were age or size specific. The majority of trunk and lower limb bones appear to be from smaller individuals, suggesting that they were brought to the site more or less complete, while only the best cuts were taken from larger animals.

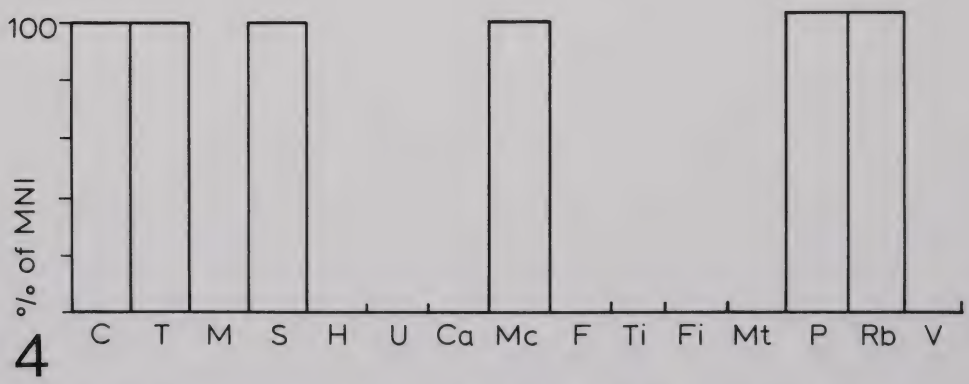
Similar patterns were observed in four other assemblages. The two fur seals in the Cross Creek Midden were incomplete, one represented by an upper forelimb and an upper hindlimb, and the other by an upper hindlimb. In both layers of Arthur Black's Midden only forelimb bones were present, and in level III at Opito they were predominant. Fur seal remains in the other assemblages appeared to represent complete or nearly complete carcasses. As these were almost all juvenile animals, the size specific butchering pattern observed at Opito level IV would appear to be confirmed.

All of the elephant seal and cetacean remains indicate that a restricted range of body parts was present in each assemblage. The sea lion in Sarahs Midden level II had all body parts represented.

The dog remains in most assemblages represented complete or nearly complete carcasses, indicating that the animals were butchered and consumed on the site. However in two assemblages a somewhat different pattern was apparent. Sarahs Gully A and B level IV and C layer 3 both contained only those bones which might be expected to be







Figs. 2-4. Proportional representation of body parts. 2. Fur seal Opito level IV. Maximum MNI = 9. 3. Dog. Sarahs Gully A and B level IV. Maximum MNI = 2. 4. Dog. Sarahs Gully C layer 3. Maximum MNI = 1.

C—cranium, T—teeth, M—Mandible, S—scapula, H—humerus, R—radius, U—ulna, Ca—carpus, Mc—metacarpus, Ph—phalanx, F—femur, Ti—tibia, Fi—fibula, Ta—tarsus, Mt—metatarsus, P—pelvis, V—vertebra, St—sternum, Rb—rib.

discarded during the butchering process. A method by which the polynesian dog might have been butchered has been proposed elsewhere (Smith 1981) and involves detaching the fore and hind limbs along with their associated musculature and then flensing the majority of the remaining flesh from the axial skeleton. If this procedure were followed, bones from the head and trunk are likely to have been discarded at the time of butchering. In the two assemblages under consideration (Figs. 3, 4) it is only these bones which occur, and none of the bones which would have been detached along with the flesh are present. Unfortunately none of the other assemblages showed a complementary pattern, with only the fore and hind limb bones present.

Meat weights

The relative importance of each mammalian species as a source of food cannot be calculated simply from their relative abundance in the excavated assemblages. Clearly, larger animals will provide a greater quantity of food per individual than will smaller ones, and an animal represented by a complete carcass more than one represented only by its forelimb. Thus it is necessary to calculate the amount of meat provided by each animal before relative dietary importance can be established.

A number of other factors must also be taken into account before so analysing these assemblages. Several assemblages contained so few bones that serious consideration must be given to the possibility that they derived from other layers in the site, and therefore do not represent food consumed during that occupation. This doubt applies to Opito level I, Sarahs Gully A and B level II, the single fragment of fur seal bone from Sarahs Gully C layer 4 and all of the bone from the upper four layers of Sarahs Gully D. The absence of detailed stratigraphical information for these assemblages makes it impossible to assess the possibility of secondary deposition of this material, and hence no attempt has been made to calculate meat weights in these instances.

A similar problem arises with Skippers Ridge and Sarahs Gully Pa. The dumping of food refuse was not a major activity at either of these sites (Birks & Birks 1960, Davidson 1975), and this is reflected in the virtual absence of bone in any of their layers. Furthermore it has been argued by their excavators, and subsequently, that each of these sites was occupied contemporaneously and in association with nearby beach front middens (Parker 1960, Birks & Birks 1960, Green 1972a, 1972b). Thus it would seem unwise to consider the few mammalian remains in these assemblages as representative of the pattern of exploitation at their time of occupation.

The estimated weight of consumed meat was calculated for nine assemblages (Table 6, Fig. 5). In all but one assemblage sea mammals provided the greatest quantity of meat. Only in Arthur Black's Midden layer 3 did the polynesian dog provide more food. Thus, while dogs generally outnumbered sea mammals, the vastly greater size of the seals and pilot whales resulted in their providing more than 75% of the estimated consumed meat weight. Possible sources of error in these calculations are more likely to have under estimated the dietary contribution of sea mammals than that of dogs, and thus their relative importance may have been greater.

It is not possible to measure the importance of sea mammals relative to other food sources as the non-mammalian fauna from these sites has not been analysed. However the impression conveyed by the few published references to faunal remains is that other food

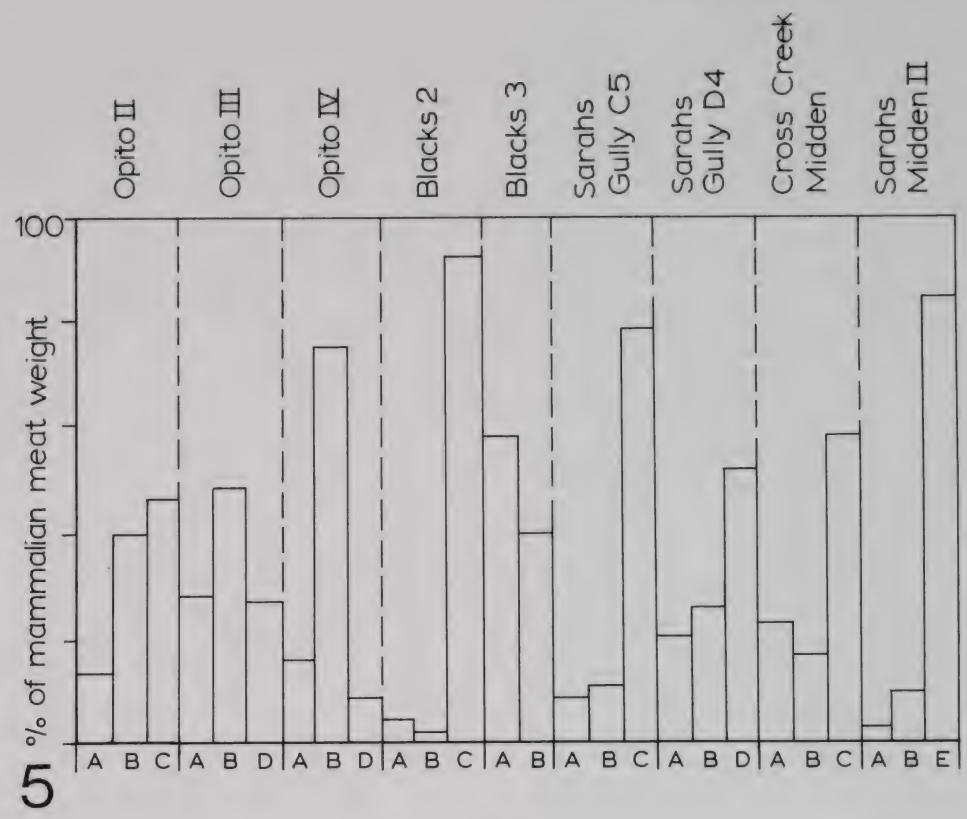

Opito II
Opito III
Opito IV
Blacks 2
Blacks 3
Sarahs Gully C5
Sarahs Gully D4
Cross Creek Midden
Sarahs Midden II
100
% of mammalian meat weight
5
A B C A B D A B D A B C A B A B C A B D A B C A B E

Fig. 5. Meat weights of mammals. A. Dog, B. Fur seal, C. Pilot whale, D. Elephant seal, E. Sea lion.

sources are not likely to have contributed an equivalent quantity of meat. Moas — the only other large animal to have been exploited — were present only in small numbers (Davidson 1979: 87), and the other birds, fish and shellfish present in the middens (Green 1963, Davidson 1979) are of much smaller size, thereby requiring enormous numbers to have been eaten to match the dietary contribution of sea mammals. While conclusions on this matter must await further analysis, comparison with the only other Archaic Coromandel site for which meat weights have been calculated supports the hypothesised pattern. In the lower occupation layer of the Whangamata Wharf site fur seals provided 63.05% of the meat, dogs 21.25%, man 7.5% birds (including Moa) 5.92% and shellfish 0.13% (Allo 1972:72-77).

All of the assemblages for which meat weights were calculated are dated either directly or by their association with Archaic artefacts to the period A.D. 1200-1500. Faunal material from the few post-Archaic assemblages was limited, but as seal and cetacean bone was absent from these it seems possible that sea mammals did not remain as a major food source beyond the 15th or 16th century. A decline in their abundance is also apparent in the upper layers of Tairua (Yaldwyn 1962:263) and Whangamata Wharf (Allo 1972:76-77).

Table 6. Meat weights of mammals.

Species/age group	mni	body parts present	estimated consumed meat weight (kg)	
Opito level II				
Dog: subadult	1	C	6.00	
adult	2	C	12.00	
no indication	1	C	6.00	24.00
Fur seal: juvenile	1	C	14.38	
subad. male	1	C	59.00	73.38
Pilot whale: no indic.	1	? est. 10%		82.96
				180.34
Opito level III				
Dog: juvenile	1	C	3.00	
adult	1	C	7.50	
no indication	3	C	18.00	28.50
Fur seal: pup	1	C	4.82	
juvenile	1	C	14.38	
subad. male	1	2FL	17.70	
ad. female	1	2FL	9.00	
no indic.	1	FL	6.64	52.54
Elephant seal: subad. male	1	? est. 10%		27.63
				108.67
Opito level IV				
Dog: juvenile	1	C	3.00	
subadult	2	C	12.00	
adult	2	C	15.00	
no indication	4	C	24.00	54.00
Fur seal: juvenile	2	C	28.76	
subad. male	4	2C, 2FL, 2HL	147.50	
ad. male	3	3FL, 3HL	70.89	247.15
Elephant seal: subad. male	1	? est. 10%		27.63
				328.78
Blacks Midden layer 2				
Dog: subadult	1	C		6.00
Fur seal: juvenile	1	FL		2.16
Pilot whale: no indic.	1	? est. 10%		82.96
				91.12

Table 6. Continued

Species/age group	mni	body parts present	estimated consumed meat weight (kg)	
Blacks Midden layer 3				
Dog: subadult	1	C	6.00	
adult	1	C	7.50	13.50
Fur seal: subad. male	1	FL		8.85
				22.35
Sarahs Gully C layer 5				
Dog: subadult	1	C	6.00	
no indication	1	C	6.00	12.00
Fur seal: juvenile	1	C		14.38
Pilot whale: no indic.	1	? est. 10 %		82.96
				109.34
Sarahs Gully D layer 4				
Dog: subadult	1	C	6.00	
no indication	1	C	6.00	12.00
Fur seal: juvenile	1	C		14.38
Elephant seal: subad. male	1	? est. 10%		27.63
				54.01
Cross Creek Midden				
Dog: juvenile	3	C	9.00	
subadult	1	C	6.00	
adult	1	C	7.50	
no indication	3	C	18.00	40.50
Fur seal: subad. male	1	FL, HL	14.75	
ad. male	1	FL	14.18	28.93
Pilot whale: no indic.	1	? est. 10%		82.96
				152.39
Sarahs Midden Level II				
Dog: no indication	1	C		6.00
Fur Seal: juvenile	1	C		14.38
Sea lion: adult male	1	C		141.75
				162.13

C=complete, FL=forelimb, HL=hindlimb

CONCLUSION

The mammalian fauna from this group of predominantly Archaic sites exhibits a remarkably consistent pattern which permits some conclusions to be drawn about aspects of prehistoric economy in the area. The hunting of sea mammals was clearly a major activity. Seals and cetaceans were the main providers of mammalian meat, and may well have been the most important food source. Among the sea mammal species, fur seals would have been the most reliable food resource. Their number and regularity of occurrence in the sites indicates that fur seal colonies existed in the Coromandel area during this period. It has been suggested that these included breeding colonies, and if this was so then these animals would have been available for hunting at all times of the year. The elephant seals and the single sea lion are too few in number to suggest the presence of colonies on the Coromandel coast. The animals represented in these sites are likely to have been occasional visitors to the area that were captured when they hauled out on local beaches.

The pilot whale remains probably do not indicate the hunting of whales at sea. Harpoons have not been recorded from the Coromandel area (Duff 1956:223-230), and as natural strandings of this species are common on New Zealand beaches (Gaskin 1968:65) their remains in these sites are likely to have resulted from the butchering of beached animals.

As well as these hunting and 'scavenging' (cf. Smith 1979:219) activities, the raising of domesticated animals for food is evidenced by the dog remains. The presence of this species in every assemblage and in considerable numbers suggests that it was a reliable and commonly eaten food. The high frequency of immature individuals supports this contention.

When the subsistence pursuits pertaining directly to the mammalian fauna are viewed alongside the other activities evidenced for these sites — moa hunting, fowling, fishing, shellfishing and horticulture — a broadly based economic system can be postulated. During the Archaic period the big-game hunting components of this system — sea mammals and moas — appear to have been the central focus. The apparent decline of moa bone in sites beyond A.D. 1500-1600 (Davidson 1979:187), and the absence of sea mammals in the few post-Archaic assemblages considered here would appear to demonstrate a movement away from this focus. Further research on post-Archaic assemblages, and in particular those containing midden components, is necessary to substantiate this contention and explore its implications.

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REFERENCES

ALLO, J.

1970 The Maori Dog: A Study of the Polynesian Dog of New Zealand. Unpublished M.A. Thesis, University of Auckland.

1971 The dentition of the Maori dog of New Zealand. *Rec. Auckland Inst. Mus.* 8:29-45.

1972 The Whangamata Wharf site (N49/2): excavations on a Coromandel coastal midden. *Rec. Auckland Inst. Mus.* 9:61-79.

BINFORD, L.R., and J.B. BERTRAM

1977 Bone frequencies and attritional processes. *In* L.R. Binford (Editor), *For Theory Building in Archaeology*. Academic Press. New York. 419p. pp.77-153.

BIRKS, L., and H. BIRKS
1960 Pa at Sarahs Gully, Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl.* 3 (2) :16-20.

BOILEAU, J.
1980 The artefact assemblage from the Opito Beach midden, N49/3, Coromandel Peninsula. *Rec. Auckland Inst. Mus.* 17: 65-95.

DAVIDSON, J.M.
1974 A radiocarbon date from Skippers Ridge (N40/7), Opito, Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl.* 17(1): 50-52.
1975 The excavation of Skippers Ridge (N40/7), Opito, Coromandel Peninsula, in 1959 and 1960. *Rec. Auckland Inst. Mus.* 12:1-42.
1979 Archaic middens of the Coromandel Coast. *In* A.J. Anderson (Editor), *Birds of a Feather.* B.A.R. International Series 62. 295p. pp.183-202.

DUFF, R.
1956 *The Moa-hunter period of Maori culture.* 2nd edition. Government Printer, Wellington. 400p.

GASKIN, D.E.
1968 The New Zealand Cetacea. *Fisheries Res. Bull.* No.1 (n.s.): 1-92.
1972 *Whales, Dolphins and Seals: with special reference to the New Zealand region.* Heinemann Educational Books, Auckland. 200p.

GOLSON, J.
1959a Excavations on the Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl. 2(2):13-18.*
1959b Culture change in prehistoric New Zealand. *In* J.D. Freeman and W.R. Geddes (Editors), *Anthropology in the South Seas . . .* Thomas Avery, New Plymouth. 267p. pp.29-74.

GREEN, R.C.
1963 Summaries of sites at Opito, Sarahs Gully and Great Mercury Island. *N.Z. Archaeol. Ass. Newsl.* 6(1):57-69.
1964 Source, ages and exploitation of New Zealand obsidian. *N.Z. Archaeol. Ass. Newsl.* 7(3):134-143.
1972a Moahunters, agriculture and changing analogies in New Zealand prehistory. *N.Z. Archaeol. Ass.Newsl.* 15(1):16-39.
1972b Additional evidence for the age of settlements at Sarahs Gully, Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl.* 15(3):89-93.

PARKER, R.H.
1960 Reconnaisance at Skippers Ridge. *N.Z. Archaeol. Ass. Newsl.* 3(2):39-41.

SMITH, I.W.G.
1976 Prehistoric fur seal exploitation on the south west coast of Chatham Island. Unpublished B.A. (Hons.) Dissertation, University of Otago.
1978 Seasonal sea mammal exploitation and butchering patterns in an Archaic site (Tairua, N44/2), on the Coromandel Peninsula. *Rec. Auckland Inst. Mus.* 15:17-26.
1979 Prehistoric sea mammal hunting in Palliser Bay. *In* B.F. and H.M. Leach (Editors), Prehistoric Man in Palliser Bay. *National Mus. Bull.* 21:1-272. pp.215-224.
1981 Mammalian fauna from an Archaic site on Motutapu Island, New Zealand. *Rec. Auckland Inst. Mus.* 18:95-105.
n.d. Sea mammals and prehistoric subsistence in New Zealand (in preparation). PhD Thesis, University of Otago.

WILSON, G.J.
1974 The distribution, abundance and population characteristics of the New Zealand Fur Seal *(Arctocephalus forsteri).* Unpublished M.Sc. Thesis, University of Canterbury.

YALDWYN, J.C.
1962 Faunal material — bone. *In* C.D. Smart and R.C. Green, A stratified dune site at Tairua, Coromandel. *Dom. Mus. Rec. Ethnol.* 1(7):256-263.

NEW AND INTERESTING RECORDS OF ADVENTIVE PLANTS FROM THE AUCKLAND INSTITUTE AND MUSEUM HERBARIUM 7

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Abstract. This seventh list of some recent additions to the Auckland Institute and Museum Herbarium (AK) and of re-determinations of earlier gatherings provides new records for some adventive species and further information on the distribution of others.

The acquisition of material by the AK Herbarium has been maintained as in former years by exchange with D.S.I.R., Botany Division, Christchurch (CHR) and the National Museum, Wellington (WELT) as well as by presentation from various collectors. This has included voucher specimens for new records and has helped to fill gaps made evident in my previous papers.

The nomenclature adopted in this paper is that published by the New Zealand Weed and Pest Control Society (1969) except for species dealt with in volume 3 of the *Flora of New Zealand* (Healy & Edgar 1980) and in the series of checklists published from time to time in the *New Zealand Journal of Botany* by members of the D.S.I.R. staff at Christchurch. In these last two works the date of the first record is that of first publication, not necessarily of the first finding, a distinction not always made by me in the past (see under *Papaver dubium* below); for greater precision and uniformity I intend following their procedure in future. For species not dealt with in any of the above works references are given to publications consulted.

Specimens are cited by the collector's numbers or in the absence of these by the AK number. Unless otherwise stated the specimens may be regarded as the only material of the species possessed by the Herbarium and, where no previous literature is cited, as first records to the best of my knowledge at the time of writing.

PAPAVERACEAE

Papaver dubium L.

Waitemata Co., Milford, waste area, 1978, E.B. Bangerter 5393.

In Bangerter (1980) I recorded two specimens from the Auckland area but omitted the above gathering as I was doubtful of the identification, since kindly confirmed by Dr Garnock-Jones, on account of its sparse pubescence. I also gave the first record as 1885,

G.M. Thomson, which appears at variance with that given in Garnock-Jones (1979) as Kirk (1899). The latter is more precise as the first published record; the former was not published until 1922 (Thomson 1922).

FUMARIACEAE

Fumaria densiflora DC.

Franklin Co., Pukekohe, 1979, R. Wood, AK 152040.

No specimen of this fumitory had been found according to Garnock-Jones (1979) up to that date. Mr A.E. Esler has since kindly supplied the above gathering to vouch for its recent discovery. The plant is said to be "troublesome in crops". Sell (1964) may be referred to for a description. The flowers are smaller and more densely crowded than in other adventive species in New Zealand.

CRUCIFERAE

Matthiola incana (L.) R.Br.

Hutt Co., between Pukerua Bay and Paekakariki, railway embankment near coast, 1979, P.J. Brownsey, AK 152498, (dupl. ex WELT).

According to Garnock-Jones (1979) stock as a naturalised plant is local but evidently widespread in distribution; it was first recorded by Kirk (1878) as *M. sinuata* from Castle Rock, Wellington. Several authors have since added further localities; the above gathering is here included as it fills a gap in the AK Herbarium.

CRASSULACEAE

Cotyledon orbiculata L.

Wellington, Moa Point, greywacke, 1979, T. Moss, AK 152496.

An account of this plant as one of a succulent element in adventive communities on coastal cliffs in Canterbury and Otago is given in Healy (1959, 1969). The above North Island gathering was acquired by exchange with WELT Herbarium.

POLYGONACEAE

Fagopyrum esculentum Moench.

Whangarei Co., Whangarei, T.F. Cheeseman, AK 70005.

Kirk (1870) recorded buckwheat from the Auckland district and Armstrong (1872) from Canterbury. Thomson (1922) and Allan (1940) repeated Kirk's record, the former

commenting that it "is largely grown by bee-keepers". Later Healy (1976) still only described it as rare and casual, whilst Connor (1977) stated "occasionally escapes from cultivation but nowadays rarely grown as a crop". Unfortunately Cheeseman's specimen is un-dated.

Polygonum punctatum E11.

Waitemata Co., Paremoremo Creek, 1978, R.O. Gardner 1990.

To the specimen cited in Bangerter (1980) the above has been added as a second gathering, although it was determined as *Polygonum* cf. *punctatum*. Dr Gardner's notes state "common on open places on stream edges" and of the leaves "peppery, not blotched, flat edged". Fruits mounted on the sheet are smooth and glossy; the tepals are white. Peppery leaves are characteristic of *P. hydropiper* but all the other characters tend towards *P. punctatum*.

CHENOPODIACEAE

Atriplex hortensis L.

Auckland, Mt Albert, Ferner Avenue, 1980, A.E. Esler, AK 152049.

Given as a first record in Healy (1958) but in South Island localities only, garden orache is also listed in Healy (1969) for Canterbury. The above North Island gathering was kindly presented by Mr A.E. Esler, who has written on the label "three plants appeared in cultivated soil in garden". Aellen (1964) provides a description.

BALSAMINACEAE

Impatiens balsamina L.

Auckland, Milford, roadside bank, 1980, E.B. Bangerter 5468.

This balsam, no doubt a garden escape, was growing among viatical adventives all of which have since succumbed to the spraying of weedkiller. I have not found any other reference to the plant as an escape although it is often grown in gardens. The species is described in Moore (1968).

CUCURBITACEAE

Sechium edule Swartz

Auckland, Mt Albert Research Centre, 1980, A.E. Esler, AK 152084, det. K.W. Hammett.

This specimen of choko was presented by Mr A.E. Esler as a voucher. Noted on the label is "growing on tall wire fence, apparently naturalised." A detailed description may be found in Bailey (1947).

HYPERICACEAE

Hypericum calycinum L.

Hokianga Co. North Hokianga, roadside near Mitimiti, 1977, A.E. Wright 1624.

Smith (1904) included this species as naturalised in Ashburton. Subsequent authors in dealing with the rose of Sharon (or Aaron's beard) have not given precise localities, until Healy (1969) listed it for Canterbury. Its particular liking for older cemeteries is pointed out in Healy (1976).

ROSACEAE

Acaena agnipila Gdg. var. *aequispina* Orchard.

Rangitikei Co., Marton, W. Townson no. 13, AK 75477, 75478 (as *Poterium officinale*).

This undated but early gathering was re-determined by Dr Orchard in 1974 and was therefore not included in his list of specimens examined (Orchard 1973).

PAPILIONACEAE

Coronilla varia L.

Nelson, 1878, T.F. Cheeseman, AK 75690; Auckland, southern motorway on-ramp from Grafton Road, 1980, A.E. Wright 3627.

The first specimen above is a potential voucher for the first record of crown vetch in Cheeseman (1906) "garden escape in vicinity of Nelson", repeated by Thomson (1922) and Allan (1940). The record is also noted in Webb (1980) where it is pointed out that "this species is sometimes planted to stabilise road cuttings." The recent specimen indicates its occurrence in the North Island.

Trifolium scabrum L.

Auckland, Devonport, T.F. Cheeseman, AK 76577; Auckland, Mt Wellington, volcanic cone, 1980, A.E. Wright 3629.

Although his specimen is undated Cheeseman (1883) recorded rough clover from "beach at Devonport, abundant in Dec. 1880", which constitutes the first record as noted in Webb (1980). Kirk (1899) reported it from "Auckland, Hawkes Bay, Wellington etc." According to Healy (1976) herbarium material examined by him proved to be *T. striatum* and the only certain occurrence was from Miranda, Firth of Thames in 1958.

ELAEAGNACEAE

Elaeagnus pungens Thunb.

Coromandel Co., roadside escape, 1966, R.C. Cooper, AK 127105; Cavalli Island Group, Motukawanui, garden remnants from around former homestead, 1979, A.E. Wright 3081.

Elaeagnus is included in the Appendix of Allan (1940) but with no locality given. A general statement in Matthews (1975) states "largely employed as a hedge, more so in the past than today". North Island records may be found in Wright (1979) for Cavalli Islands, Beever (1980) for the Auckland area and Esler (1980) for Motuihe in the Hauraki Gulf.

UMBELLIFERAE

Anthriscus caucalis Bieb.

Hutt Co., Upper Hutt, Harcourt Park, under *Cupressus macrocarpa,* 1979, T.C. Moss, AK 152497 (dupl. ex WELT); Ashburton Co., Elgin, pasture paddock 1979, J.G. Spell, AK 150792 det. C.J. Webb (dupl. ex CHR 355739).

The distribution of beaked parsley may be found in Webb (1978), where the first record (as *A. vulgaris* Pers.) is attributed to Thomson (1922) who published the finding of the plant in 1917 by Mr Warden at Wyndham, Otago. Allan (1940) repeated the record and the species appears in the list of Canterbury adventives in Healy (1969). It was known from "the northern half of the North Island and eastern Southland" according to Matthews (1975). The above specimens, acquired from Wellington and Christchurch respectively, are welcome additions to the AK Herbarium.

LOGANIACEAE

Buddleia davidii Franch.

Waitemata Co., Huia, garden escape, 1951, K. Wood, Auckland Botanical Society's Auckland Collection 5417.

Since the 1973 specimen of buddleia was recorded, in Bangerter (1977) as the only example in the Herbarium, several later gatherings have been added. The above, however, is a much earlier one.

COMPOSITAE

Lactuca serriola L.

Auckland, Devonport, Mt Victoria, growing on rough weedy scoria heap, 1980, A.E. Wright 3511.

Cheeseman (1925) recorded prickly lettuce from Onehunga, 1912, repeated by Thomson (1922) and Allan (1940). It is listed in Healy (1969) for Canterbury but no localities are mentioned in Healy (1976). Although it was known from a few more South Island localities, Matthews (1975) said of it "rare to infrequent in the North Island". The AK specimen shows the characteristic olive-grey achenes.

Petasites fragrans (Vill.) C. Presl.

Auckland, steep bank above Churchill Road, Constitution Hill, 1981, A.E. Wright 3823.

Winter heliotrope is listed in the Appendix of Allan (1940) but with no locality. That it is particularly addicted to cemeteries may be gleaned from Healy (1969, 1973), Connor (1977) and Esler (1978). There is no specific locality given in Matthews (1975) but from him and other authors it is evident that the plant is never found far from man's horticultural activities. A note on the label of the above gathering states "well established colony beneath oak trees bordering road."

Soliva valdiviana Phil.

Waitemata Co., Milford, roadside grass verge, 1981, E.B. Bangerter 5496.

A note on this species of Onehunga-weed appeared in Bangerter (1978). In spite of its being probably the commonest species, this is only the second sheet in the Herbarium, the locality being further north than the first.

POLEMONIACEAE

Cobaea scandens Cav.

Wellington, Chaytor Street, climbing over vegetation, 1979, P.J. Brownsey AK 152738; Auckland, Mt Albert, scrambling over shrubs, 1980, A.E. Esler, AK 152045.

Day's Bay, Wellington, is the locality for the first record of cobaea in Healy (1946). From Healy (1973) and Adams (1980), where it is figured, we learn that this climber invades the fringes of bush communities. Some localities in the Manawatu area are given in Esler (1978) and Beever (1980) includes it in a list for an Auckland area. The above two gatherings fill yet another gap in the Herbarium.

LILIACEAE

Ipheion uniflorum (Lindl.) Raf.

Hokianga Co., Waipoua State Forest, Kawerua, 1976, A.E. Wright 1393; Wellington, Paraparaumu, 1978, P.J. Brownsey, AK 149152.

Healy & Edgar (1980) have given only the South Island as the distribution of the spring star-flower. The above gatherings indicate its occurrence in the North Island.

GRAMINEAE

Echinochloa crus-pavonis (H.B.K.) Schultes

Matamata Co., Matamata, railway line, 1977, D.J. Court, AK 143600.

Since my earlier records (Bangerter 1975), a number of Auckland specimens have been added to the Herbarium. The above adds a new area to the distribution.

Setaria palmifolia (Koen.) Stapf.

Auckland University Grounds, escape from cultivation, 1977, J.E. Braggins, AK 151346, det. A.E. Wright 1980 (dupl. ex AKU).

This grass was "getting established in many places" according to Mr A.E. Esler in a letter dated May 1979. The above specimen was kindly presented by Dr Braggins as a duplicate from the Auckland University Herbarium. A description and illustration may be found in Henty (1969), where it is said to be cultivated as a vegetable in New Guinea.

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REFERENCES

ADAMS, N.M.
1980 *Wild flowers in New Zealand*. A.H. & A.W. Reed, Wellington. 44p.

AELLEN, P.
1964 *Atriplex* L. In *Flora Europaea* Vol. 1. Tutin, T.G. *et al.* (Eds.), University Press, Cambridge. pp.95-97.

ALLAN, H.H.
1940 A handbook of the naturalised flora of New Zealand. *N.Z. Dep. Scient. Ind. Res. Bull.* 83 : 1-344.

ARMSTRONG, J.F.
1872 On the naturalised plants of the Province of Canterbury. *Trans. Proc. N.Z. Inst.* 4: 284-290.

BAILEY, L.H.
1947 *Standard cyclopedia of horticulture* Vol. 3. Macmillan, New York. pp.2423-3639.

BANGERTER, E.B.
1975 New and interesting records of adventive plants from the Auckland Institute and Museum Herbarium 1. *Rec. Auckland Inst. Mus.* 12: 91-94.
1977 New and interesting records of adventive plants from the Auckland Institute and Museum Herbarium 3. *Rec. Auckland Inst. Mus.* 14: 57-62.
1978 New and interesting records of adventive plants from the Auckland Institute and Museum Herbarium 4. *Rec. Auckland Inst. Mus.* 15: 27-35.
1980 New and interesting records of adventive plants from the Auckland Institute and Museum Herbarium 5. *Rec. Auckland Inst. Mus.* 16: 77-85.

BEEVER, J.
1980 St John's College and Tahuna-Torea . *Auck. Bot. Soc. News Letter* 37th year (Jan.): 17-20.

CHEESEMAN, T.F.
1883 The naturalised plants of the Auckland provincial district. *Trans. Proc. N.Z. Inst.* 15: 268-298.
1906 *Manual of the New Zealand flora.* 1st. ed. Government Printer, Wellington. 1199p.
1925 *Manual of the New Zealand flora.* 2nd. ed. Government Printer, Wellington. 1163p.

CONNOR, H.E.
1977 *The poisonous plants in New Zealand* 2nd. ed. Government Printer, Wellington. 247p.

ESLER, A.E.
1978 Botany of the Manawatu district, New Zealand. *N.Z. Dep. Scient. Ind. Res. Inf. Ser.* No. 127: 1-206.
1980 Botanical features of Motutapu, Motuihe and Motukorea, Hauraki Gulf, New Zealand. *N.Z.J.Bot.* 18: 15-36.

GARNOCK-JONES, P.J.
1979 Checklist of dicotyledons naturalised in New Zealand. 4. Rhoeadales. *N.Z.J.Bot.* 17: 303-310.

HEALEY, A.J.
1946 Contributions to a knowledge of the naturalised flora of New Zealand. No. 1. *Trans. Proc.R.Soc.N.Z.* 75: 399-404.
1958 Contributions to a knowledge of the adventive flora of New Zealand. No. 6. *Trans. R.Soc.N.Z.* 85: 531-549.
1959 Contributions to a knowledge of the adventive flora of New Zealand. No.8. *Trans. R.Soc.N.Z.* 87: 229-234.
1969 The adventive flora in Canterbury. In *The natural history of Canterbury.* G.A. Knox (Ed.) A.H. & A.W. Reed, Wellington. pp.261-333.
1973 Introduced vegetation. In *The natural history of New Zealand.* G.R. Williams (Ed.) A.H. & A.W. Reed, Wellington. pp.170-189.
1976 *Identification of weeds and clovers.* 2nd. ed. Editorial Services, Wellington. 271p.

HEALY, A.J., AND E. EDGAR
1980 *Flora of New Zealand* Vol. 3. Government Printer, Wellington. 220p.

HENTY, E.E.
1969 A manual of the grasses of New Guinea. *Dept. of Forests Bot.Bull.* 1: 1-215.

KIRK, T.
1870 On the naturalised plants of New Zealand, especially with regard to those occurring in the Province of Auckland. *Trans.Proc.N.Z.Inst.* 2: 131-146.
1878 On the naturalised plants of Port Nicholson and the adjacent district. *Trans. Proc.N.Z.Inst.* 10: 362-378.
1899 *The students' flora of New Zealand and the outlying islands.* Government Printer, Wellington. 408p.

MATTHEWS, L.J.
1975 *Weed control by chemical methods.* Government Printer, Wellington. 710p.

MOORE, D.M.
1968 *Impatiens* L. In *Flora Europaea* Vol.2. Tutin, T.G. *et al.* (Eds.) University Press, Cambridge. pp.240-241.

NEW ZEALAND WEED AND PEST CONTROL SOCIETY
1969 *Standard common names for weeds in New Zealand.* Editorial Services, Wellington. 141p.

ORCHARD, A.E.
1973 The *Acaena ovina* (Rosaceae) complex in New Zealand. *Rec. Auckland Inst. Mus.* 10: 97-107.

SELL, P.D.
1964 *Fumaria* L. In *Flora Europaea* Vol.1. Tutin, T.G. *et al.* (Eds.) University Press, Cambridge. pp.255-258.

SMITH, W.W.
1904 Plants naturalised in the county of Ashburton. *Trans.Proc.N.Z.Inst.* 36: 203-225.

THOMSON, G.M.
1922 *The naturalisation of animals and plants in New Zealand.* University Press, Cambridge. 270p.

WEBB, C.J.
1978 Checklist of dicotyledons naturalised in New Zealand.1. Umbelliferae. *N.Z.J.Bot.* 16: 387-390.
1980 Checklist of dicotyledons naturalised in New Zealand. 5. Leguminosae. *N.Z.J.Bot.* 18: 463-472.

WRIGHT, A.E.
1979 Vascular flora of Motukawanui Island, Cavalli Group, northern New Zealand. *Tane* 25: 101-107.

REVISION OF THE AUSTRALIAN AND NEW ZEALAND TERTIARY AND RECENT SPECIES OF THE FAMILY NASSARIIDAE (MOLLUSCA: GASTROPODA)

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Abstract. Eighty taxa proposed either in the family Nassariidae or subsequently referred to this family, have been elucidated. In this account 13 Recent and 8 Tertiary species from Australia, 2 species from the Austral-Neozelanic region and 1 Recent and 1 Tertiary species of Nassariidae from New Zealand are recognized as valid. *Nassarius (Gussonea)wilsoni* (Ludbrook, 1978) is a secondary homonym of *Nassa wilsoni* C.B. Adams, 1852, and will need to be replaced.

Species of Nassariidae are not particularly numerous in the temperate waters of the Austral-Neozelanic region and only 16 species belonging to 8 genus-groups live in that area. This number represents only 7-8% of all known living species. A fossil record of 9 species shows that there has been a slight increase in the number of species since the Late Tertiary. From the 80 names proposed for the group, 4 names belong to non-nassarid taxa, 39 are synonyms, 12 names are applicable to widely distributed tropical Indo-Pacific species and 25 are considered to belong to recognized species restricted to the Austral-Neozelanic region. Australian Recent and Tertiary species outnumber the rather impoverished nassarid fauna of New Zealand (Table 1).

Table 1. Number of Recent and Tertiary species of Nassariidae in Australia and New Zealand.

	Australia Recent	Australia & N.Z. Recent	N.Z. Recent	Australia Tertiary	N.Z. Tertiary
(Alectrion) spp.	2	1	1	—	—
(Plicarcularia) spp.	2	—	—	—	—
(Niotha) spp.	2	—	—	4	—
(Zeuxis) spp.	3	—	—	2	—
(Gussonea) spp.	—	—	—	1	—
(Hima) spp.	1	—	—	1	1
(Cryptonassarius) spp.	—	1	—	—	—
Cyllene spp.	3	—	—	—	—
Total	13	2	1	8	1

The first record of Nassariidae in the Austral-Neozelanic region was the appearance of *Nassarius (Hima) tatei tatei* (Tenison-Woods,1879) and *N.(H.) tatei socialis* (Hutton,1886) during the lower Miocene in both Australia and New Zealand at a time when species of *Hima* were numerous and flourishing in Europe. Although in New Zealand *Hima* species became extinct, two species still survive in Australian waters. Species of

Niotha, Zeuxis and *Plicarcularia* made their appearance during the Lower Pliocene and *Gussonea* and *Alectrion* appeared during Pleistocene times. Species of *Cryptonassarius* and *Cyllene* have not been recorded in fossil form from either Australia or New Zealand.

Drawings of radulae of Australian and New Zealand species of Nassariidae have been given by Ponder (1968) and Cernohorsky (1972).

List of recognized species of Australian - New Zealand Recent and Tertiary Nassariidae (asterisk denotes fossil species)

Nassarius (Alectrion) aoteanus Finlay,1927. Recent, New Zealand.
N. (A.) spiratus (A.Adams,1852). Recent, E.Australia-Norfolk I-Lord Howe I-Kermadec I-New Zealand.
N (A.) glans particeps (Hedley, 1915). Recent, Southern Australia
N. (A.) psila (Watson,1882). Recent, Torres St., Nth.Australia.
N. (Plicarcularia) burchardi (Dunker in Philippi,1849). Recent, Southern Australia.
N. (P.) jonasii (Dunker,1846). Recent, Southern Australia.
N. (Niotha) pauperatus (Lamarck,1822). Recent, Southern Australia.
N. (N.) nigellus (Reeve,1854). Recent, East and Southern Australia.
* *N. (N.) sublirellus* (Tate, 1888). L.Pliocene, S.E. Australia.
* *N. (N.) crassigranosus* (Tate,1888). L.Pliocene, S.E. Australia.
* *N. (N.) nuttalli* (Ludbrook,1978). E.Pleistocene, S.W. Australia.
* *N. (N.)* sp. Pleistocene, S.W. Australia.
N. (Zeuxis) dorsatus (Roeding,1798). Recent, Northern Australia and southern coast of Papua New Guinea.
N. (Z.) pyrrhus (Menke,1843). Recent, Southern Australia.
* *N. (Z.) subcopiosus* (Ludbrook,1958). Pliocene-Pleistocene, Southern Australia.
* *N. (Z.) spiraliscabrus* (Chapman & Gabriel,1914). Pliocene, S.E. Australia.
N. (Z.) fraudator Cernohorsky,1980. Recent, Northern Australia and southern coast of Papua New Guinea.
* *N. (Gussonea) wilsoni* (Ludbrook,1978) [nom.praeocc.] L.Pleistocene, S.W. Australia.
* N. *(Hima) tatei tatei* (Tenison-Woods,1879). L. Miocene - U. Pliocene, Southern Australia.
* *N. (H.) tatei socialis* (Hutton,1886). Miocene, New Zealand.
N. (H.) mobilis (Hedley & May,1908). Recent, S.E. Australia.
N. (Cryptonassarius) ephamillus (Watson, 1882). Recent, Australia and New Zealand.
Cyllene lactea Adams & Angas,1864. Recent, S.E. Australia.
C.royana (Iredale,1924). Recent, S.E. Australia.
C.sulcata Sowerby,1859. Recent, West Australia.

The following abbreviations have been adopted in this paper: AIM = Auckland Institute and Museum, Auckland; AMS = Australian Museum, Sydney; ANSP = Academy of Natural Sciences, Philadelphia; BMNH = British Museum (Natural History), London; MCZ = Museum of Comparative Zoology, Harvard University; MHNG = Muséum d'Histoire Naturelle, Geneva; NMNZ = National Museum of New Zealand, Wellington; NMV = National Museum of Victoria, Melbourne; NZGS = New Zealand Geological Survey, Lower Hutt; OMD = Otago Museum, Dunedin; SAM = South Australian Museum, Adelaide; TMAG = Tasmanian Museum and Art Gallery, Hobart; USNM = National Museum of Natural History, Smithsonian Institution, Washington; WAM = Western Australian Museum, Perth; ZMC = University Zoological Museum, Copenhagen; ZMHU = Zoological Museum, Humboldt University, Berlin.

The two dimensions given in the text represent the length x width of the specimens expressed in "mm". The single measurement cited in the explanations to figures represents the length of the specimen.

Order **NEOGASTROPODA**

Superfamily BUCCINACEA Rafinesque, 1815

Family NASSARIIDAE Iredale, 1916

Subfamily NASSARIINAE Iredale, 1916

(A decision on the validity of the family-group name is pending with the International Commission on Zoological Nomenclature No. Z.N. (S.) 1887).

Genus **Nassarius** Duméril, 1806

Subgenus **Alectrion** Montfort, 1810

Alectrion Montfort, 1810, Conch.Syst. 2:566. Type species by OD *A.papillosus* = *Buccinum papillosum* Linnaeus, 1758. Recent, Indo-Pacific.
1827. *Alectryon* Berthold in Latreille, Nat.Fam.Thierr. pp.187,564 (*nom.null.*).

Species of the subgenus *Alectrion* differ from *Nassarius s.str.* in its usually thinner and less strongly sculptured shell, a smaller and more constricted columellar callus, edentulous columella and smooth or finely lirate aperture.

GEOGRAPHICAL DISTRIBUTION. Tropical and temperate Indo-Pacific.

Only one Recent endemic species is known from New Zealand, 1 Recent species lives in the Austral-Neozelanic region and 2 Recent species are endemic to Australia.

Nassarius (Alectrion) aoteanus Finlay, 1927 (Figs. 1,2)

1915. *Arcularia coronata* var. E.A.Smith, Brit.Ant.(Terra Nova) Exp.Zool. 2:85,pl.1,fig.28 (non *Buccinum coronatum* Bruguière,1789 = *Nassarius).*
1927. *Nassarius aoteanus* Finlay, Trans.Proc.N.Z.Inst. 57:419 (nom.subst. pro *Arcularia coronata* E.A.Smith,1915); 1952 Powell, Rec.Auckland Inst. Mus. 4:182; 1966 Fleming, N.Z.Dept.Sci.Ind.Res.Bull. No.173:63; 1966 Beu, Trans.R.Soc.N.Z.,Geol. 4(9):180.
1968. *Nassarius(Alectrion)aoteanus* Finlay, Ponder,Rec.Dominion Mus.6:41, figs.13,14 (radula & operculum); 1972 Cernohorsky, Rec.Auckland Inst. Mus.9:183,fig.149 (shell),fig.156-159 (radula); 1979 Powell, New Zealand Moll. p.204,pl.43,figs.1,2.

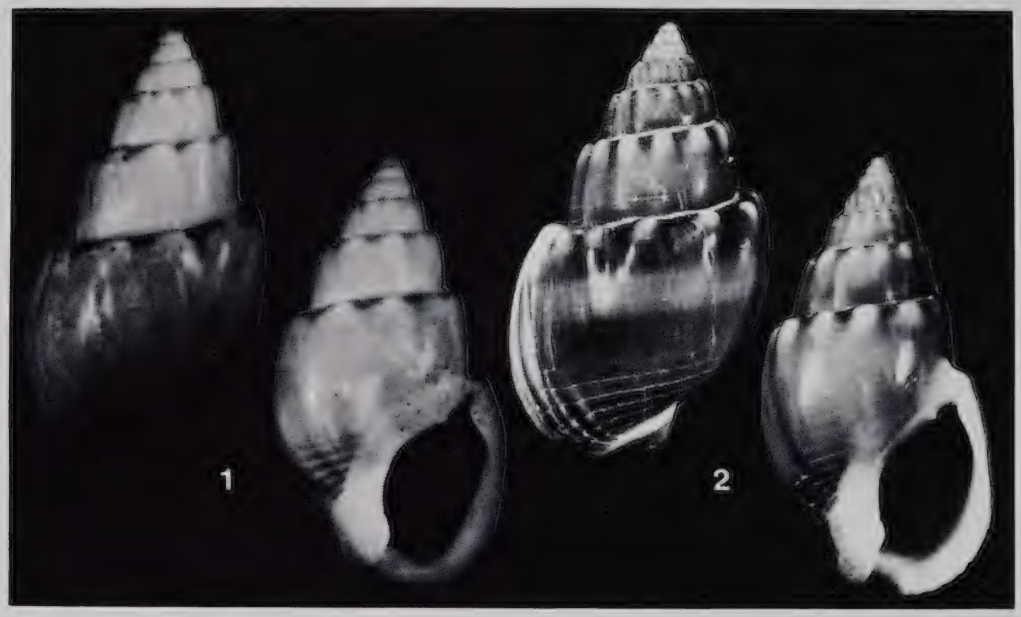
Shell up to 37.0 mm in length, sutures tabulated, protoconch with 3-3¼ finely keeled embryonic whorls, first 3 post-embryonic whorls with axial ribs and fine spiral grooves, grooves becoming obsolete on last 2 whorls, and if present, confined to sutures; axial ribs on last 2 whorls most prominent at sutures where they become coronate and weaken towards the base. Base of shell with *c.* 6 spiral grooves, back of outer lip thickened by 2-3 crowded axial ribs. Columellar callus partly overlapping on to body whorl, slightly thinner and glazed above parietal wall, columella smooth apart from a parietal denticle, outer lip edentulous, aperture smooth; in mature individuals edge of outer lip has a few, small and blunt denticles. Tan to brown in colour, ornamented with 1-2 faint, broad and darker brown bands on the body whorl and dark brown spots between the sutural coronations, columellar callus and edge of outer lip white, interior of aperture brown. Operculum translucent light brown, margins either simple or serrated on one or both sides.

Rachidians of radula with 13-14 denticles, small oval accessory plate present, lateral teeth bicuspid, inward pointing cutting edge of the broad cusp either simple or minutely denticulate.

TYPE LOCALITY. Near North Cape, New Zealand, 11-20 fathoms (20-37 m).

DISTRIBUTION. Confined to the N.E. coast of the North Island of New Zealand, from Doubtless Bay to Ranfurly Bank, East Cape. From 11-275 m, in sandy mud.

Type specimens. The holotype of *N.(A.)aoteanus* is in the BMNH No. 1915.4.18.244., dimensions 27.1 x 14.8 mm (Fig. 1).



Figs. 1,2. *Nassarius(Alectrion)aoteanus* Finlay. 1. Holotype BMNH No. 1915.4.18.244.; 27.1 mm. 2. Specimen from Bergen's Pt., Doubtless Bay, New Zealand; 27.0mm

Material examined. New Zealand: off Doubtless Bay, 34°56'S & 173°34'E, 47 m (NMNZ); Bergen's Pt., Doubtless Bay, 37 m (coll.Clifford); off Takau Bay, Whangaroa, 82 m (Ponder,1968); Outer Bay of Islands, 35°06'S & 174°12'E, 106 m; N.E. of Ninepin Rock, 35°09'S & 174°10'E, 75 m (both NMNZ); off Hen & Chicken Is (coll.Powell); off Twin Rocks, 46-73 m; between Hope Passage and Deepwater Cove, 37-40 m (both NMNZ); Oke Bay, Bay of Islands, 55 m (coll.Eker); Whangamumu Harbour, 11-13 m (coll.Powell); off Poor Knights Is, 35°22'S & 174°43'E, 146 m, and 35°32'S & 174°41'E, 113-121 m (NMNZ); between Outer Hen & Chicken Is and Mokohinau, 113 m (coll.Powell); Craddock Channel, between Little & Gt.Barrier Is, 37 m (coll.Clifford); Tryphena and Kaitoke, Gt. Barrier Is (coll.Powell); Te Anaputa, Coromandel, 27 m; N. of Cuvier I, 110 m (both NMNZ); off Cuvier I, 73 m; Outer Hauraki Gulf; off Aldermen I, 275 m (all coll.Powell); off E. side of Mayor I, 37°17'S & 176°18'E, 59-74 m, and 104-109 m;

White I, 37°30'S & 177°10'E, 62 m; Ranfurly Bank, East Cape, 37°33'S & 178°50'E, 89-94 m; Rungapapa Knoll, W. White I, 37°34'S & 176°59'E, 188-228 m; off Plate I, 183 m; Bay of Plenty; *c*.9 km N. of Motuhora I, 37°46'S & 177°00'E, 72-84 m (all NMNZ).

Fossil record: Pleistocene: Te Piki, Cape Runaway, Castlecliffian (AIM).

Nassarius (Alectrion) spiratus (A.Adams,1852) (Figs. 3-5)

1852. *Nassa spirata* A.Adams, Proc.Zool.Soc.Lond.Pt.19:106; 1853 Reeve, Conch.Icon. 8:pl.2,figs.13a,b.
1910. *Alectrion spiratus* (A.Adams), Iredale,Proc.Malac.Soc.Lond. 9:71.
1915. *Arcularia spiratus* (A.Adams), Oliver,Trans.Proc.N.Z.Inst. 47:534; 1916 Hedley, J.R.Soc.W.Austral. 1:61.
1918. *Nassarius spiratus* (A.Adams), Hedley, J.Proc.R.Soc.N.S.W. 51:M88; 1952 Powell, Rec.Auckland Inst.Mus. 4:182; 1955 Cotton, R.Soc.Sth. Australia Malac.Sect. No. 7:2,fig.3; 1962 Iredale & McMichael, Aust. Mus.Mem. No. 11:67.
1968. *Nassarius(Alectrion)spiratus* (A.Adams), Ponder, Rec.Dominion Mus. 6:41,pl.1,fig.11 (radula),fig.12 (operculum); 1972 Cernohorsky, Rec. Auckland Inst.Mus. 9:183,fig.140 (shell), fig.148 (radula); 1976 Powell, Rec.Auckland Inst.Mus. 13:155; 1979 Powell, New Zealand Moll. p.205,pl.43,figs.3,4; 1979 Cernohorsky, Trop.Pacif.Mar.shells p.89, pl.28,fig.3.

Figs. 3,4. *Nassarius(Alectrion)spiratus* (A.Adams). 3. Lectotype BMNH (no No.); 22.0 mm. 4. Specimen from Matapouri, N.E. of Whangarei, New Zealand; 21.0 mm.

Shell up to 24.0 mm in length, sutures narrowly tabulated, first 2 post-embryonic whorls axially ribbed and spirally corded, axial ribs persisting to penultimate whorl but becoming obsolete on body whorl, protoconch with 3-3½ finely keeled embryonic whorls. Columellar callus thickened anteriorly but thin and glazed above the parietal wall, columella smooth exept for a parietal denticle, outer lip edentulous, aperture smooth. Cream in colour, ornamented with irregular, short, reddish-brown lines and arrow-shaped markings and short axial streaks at sutures; protoconch white or pale violet, first 2 post-embryonic whorls frequently flushed with violet, columellar callus and edge of aperture white, interior of aperture light orange-brown. Operculum orange-brown in colour with a blackish-brown mark in the shape of a dagger, margins either simple or serrate.

Rachidian of radula with 13-15 denticles, oval accessory plate present, lateral teeth bicuspid, basal margin of the inward pointing cusp either simple or minutely denticulate.

TYPE LOCALITY. Swan River, Australia = error. Long reef. Collaroy, New South Wales, Australia, here designated (specimens in AMS).

DISTRIBUTION. From Ulladulla to Ballina, N.S.W., Australia to Lord Howe I, Norfolk I, Kermadec Is and the N.E. coast of the North I (North Cape — N. of Auckland), New Zealand. Intertidal, in sand.

Type specimens. Three syntypes of *N.(A.) spiratus* are in the BMNH (no number), and the illustrated syntype, dimensions 22.0 x 12.4 mm (Fig. 3) is here selected as the lectotype.

Material examined. Australia. New South Wales: Ballina; Clarence River; Wooli; Woogoolga (all AMS); Port Jackson (NMV); Palm Beach, N. of Sydney; Narrabeen; Long reef, Collaroy; (all AMS); Maroubra (NMV); Long Bay (AMS; NMV); Kurnell; Wollongong; Burril Lake near Ulladulla (all AMS); Shellharbour (AIM); Lord Howe I: (AMS; NMV; coll.Powell); Norfolk I: (AMS; NMV; NMNZ; USNM); Emily Bay; Slaughter House Bay (both NZGS); Pt.Hunter Reserve; Kingston graveyard (both AMS); Kermadec Is: Coral Bay (AIM); Raoul I (AMS); Macauley I; Benham Bay, Sunday I (both NMV); New Zealand: Tom Bowling Bay, N. Cape (AIM); Whatuwhiwhi, Doubtless Bay (AIM; NMNZ); Cavalli I; Whangaroa (both coll.Powell); Horseshoe Bay, Matapouri (coll.Douglas); Matauri Bay (coll.Powell); Matapouri (AIM); Kaitoke and Arid I, Gt.Barrier I; Tryphena and Oruawharo, Gt.Barrier I (both NMNZ); Pacific Bay; Church Bay (both coll. Crosby); Takau Bay (AIM).

The species has usually been considered to be of rare occurence in New Zealand, but a large colony of over 200 specimens has been observed between Paua and the Bay of Islands (The Editor 1975). A living animal from Matapouri is here illustrated (Fig. 5).

Originally described from "Swan River", Western Australia, I have not been able to trace specimens collected in any other Australian locality apart from New South Wales, although Cotton (1955) illustrates a specimen from Port Lincoln, South Australia. Macpherson & Gabriel (1962) do not report the species from Victoria.

Fig. 5. *Nassarius(Alectrion)spiratus* (A.Adams). Animal from Horseshoe Bay, Matapouri, N.Z.; 20.0 mm (photo N.Douglas).

Nassarius (Alectrion) glans particeps (Hedley,1915) (Figs. 6-10)

1853. *Nassa suturalis* var. Reeve, Conch.Iconica 8:pl.2,figs.11a,b (non *Buccinum suturale* Lamarck,1822 = *Nassarius).*
1853. *Nassa rufula* Kiener, Reeve, Conch.Iconica 8:pl.2,fig.14 (non *Buccinum rufulum* Kiener,1834).
1868. *Nassa(Alectrion)suturalis* var. Lam., Cox, Exch.List Land & Mar.shells Aust. p.4.
1876. *Nassa suturalis* Lamarck, Angas, Quart.J.Conch. 1:178.
1913. *Alectrion suturalis* subsp. *dunkeri* Suter, Man.N.Z.Moll. p.398; 1915 Suter, *ibid.* Atlas, pl.45,fig.17; 1915 Iredale, Trans.Proc.N.Z.Inst. 47:467 (non Suter,1908).
1915. *Arcularia particeps* Hedley, Proc.Linn.Soc.N.S.W. 39:738 (ref. to Reeve, 1853, pl.2,fig.11, and Marrat,1877,pl.1,fig.3); 1917 Hedley, Proc.Linn.Soc.N.S.W. 41:712,pl.49,fig.20 (animal).
1917. *Nassa particeps* (Hedley), Odhner, Kungl.Svenska Vet.Handl. 52:51.
1918. *Nassarius particeps* (Hedley), Hedley, J.Proc.R.Soc.N.S.W. 51:M88; 1932 Cotton & Godfrey,Sth.Austral.Nat. 13:96,pl.1,fig.5; 1952 Powell, Rec.Auckland Inst.Mus. 4:182; 1955 Cotton, R.Soc.Sth.Austral.Malac. Sect. No.7:2,fig.1; 1959 Child, Austral.Sea shells p.34,textfig.37; 1962 Iredale & McMichael, Austral.Mus.Mem. No. 11:67; 1966 Anderson, Proc.Linn.Soc.N.S.W. 90(3):247,fig.12 (egg-capsules),fig.13 (veliger); 1917 Wilson & Gillet, Austral.shells p.11,textfig.3 (animal); 1980 Roberts & Wells, Rec.W.Australian.Mus. 8(3):345.
1925. *Arcularia rufula* Kiener, Reath, J.R.Soc.W.Australia 11(6):40.
1961. *Nassarius(Alectrion)particeps* (Hedley), Rippingale & McMichael, Queensl.& Gt.Barrier reef shells p.105,pl.13,fig.20.
1962. *Alectrion particeps* (Hedley),Macpherson & Gabriel, Mar.Moll.Victoria No.2:193,textfig.230.
1966. *Nassarius rufula* Kiener, Hodgkin et.al., W.Austral.Nat.Club Handb. No.9:43.
1971. *Alectrion rufula* (Kiener), Wilson & Gillett, Austral.shells p.102, pl.66,fig.12.
1972. *Nassarius(Alectrion)glans particeps* (Hedley), Cernohorsky, Rec.Auckland Inst.Mus. 9:180,figs.137,138 (shell), fig.147 (radula); 1976 Powell, Rec.Auckland Inst.Mus.13:155; 1979 Powell, New Zealand Moll. p.205,pl.43,fig.5.
1980. *Nassarius rufulus* (Kiener), Roberts & Wells, Rec.W.Austral.Mus. 8(3):346.

Shell up to 32.0 mm in length but frequently smaller, moderately thin, teleoconch of 6-6½ convex whorls, protoconch of 1½-1¾ slightly mamillate embryonic whorls. Early spire whorls sculptured with axial riblets and spiral grooves, last 2-2½ whorls smooth apart from macroscopic growth-striae, sutures usually narrowly ledged but receding in

West Australian populations. Interior of aperture smooth, outer lip simple or with 3-4 very small denticles anteriorly, columella smooth apart from a single fold basally, siphonal notch prominent, anal canal distinct, parietal denticle strong. White to cream in colour, occasionally suffused with violet, protoconch white or purple-brown, upper spire whorls frequently violet, whorls ornamented with wide-spaced brown lines, body whorl with 2-3 spiral rows of small squarish brown spots and occasionally wavy streaks, edge of aperture white, interior brown. In populations from the south and west coast of Australia some individuals become more inflated and barrel-shaped and the sutures are convex rather than narrowly ledged; the colouring varies from an almost uniform dark brown through banded forms to pure white.

Rachidian of radula with 12 denticles, oval accessory plate present, lateral teeth bicuspid.

The spawn of *N.glans particeps* is similar to that of its nominate subspecies *N.glans glans*. Egg-capsules are triangular with long stalks and contain a single large egg. Development is direct with young hatching as crawling juveniles (Anderson 1966). The direct development of single-egged capsules is also reflected in the species paucispiral protoconch (1½-1¾ whorls).

Hedley (1917) illustrated the living animal which he described as cream, irregularly splashed with black. Another illustration appeared in Wilson & Gillett (1971).

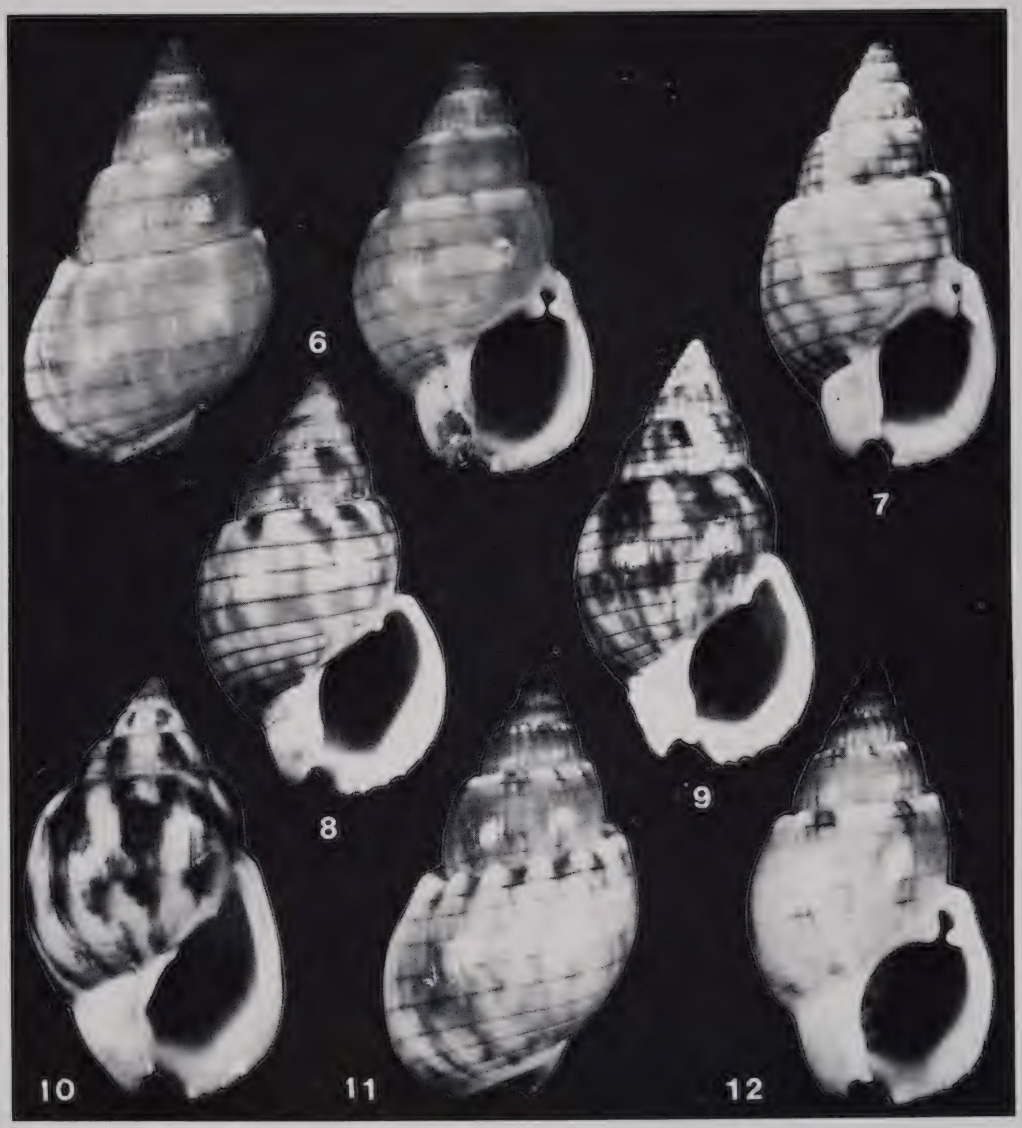
TYPE LOCALITY. Sydney, N.S.W., Australia.

DISTRIBUTION. From Proserpine, Queensland, along the south Australian coast to Port Hedland, West Australia. Not recorded from Tasmania. From the subtidal zone to a depth of 77 m, in sand.

Type specimens. The holotype of *N.(A.)glans particeps* is in the AMS No. C-32708, dimensions 24.0 x 13.0 mm (Fig. 6).

Material examined. (Typical *glans particeps)*. Australia. Queensland: Mooloolaba (NZGS); Dingo Beach, off Proserpine (coll.Marrow); Caloundra; off Moreton Bay, 27°27'S & 153°39'E, 77 m; between Dunwich and Nyora, Stradbroke I; Burleigh Heads (all AMS); New South Wales: off Tweed Heads, 28°17'S & 153°44'E, 73 m; Ballina; Woody Head; Iluka; Shelley Beach, Angourie; Minnie Waters; Wooli; Woogoolga; Fairy Bowers; off Manning River (all AMS); Tuncurry (USNM); Merewether Beach, Newcastle; Bradley Head; Norah Head; Boat Harbour, near The Entrance (all AMS); S.side of The Entrance (NZGS); near Pearl Beach, Broken Bay (AMS); Long reef, Sydney (AIM; NMV); Manly (coll. Powell); Port Jackson (AIM); Sydney Harbour (ZMC); Tong Bay (USNM); Cape Banks (AMS); Kurnell, Botany Bay (AIM; AMS; USNM); Gunamatta Bay, Cronulla (AMS; ZMC); Coalcliff; Shellharbour; Jervis Bay; Huskisson (all AMS); Hyam's Beach, Jervis Bay (NZGS); Ulladulla; Broulec, near Bateman's Bay (both AMS); Twofold Bay (AMS; ZMC); Victoria: Lakes Entrance; Port Arlington; Western Port (all NMV); South Australia: Smoky Bay (NMV); St.Francis I, 32°30'S & 133°21'E, 20 m (AMS); Port Lincoln (NMV); Tumby Bay (AMS); Port Willunga (AIM; NMV); Yankallilla Bay, St.Vincents Gulf (USNM); Western Australia: Two People's Bay, Albany (AMS); S.W. of Cape Naturaliste (WAM); W. of Bunbury (AMS); Cockburn Sound

(NMV; USNM); off Rottnest I (coll.Roberts); N.W. of Jurien Bay, 29°59'S & 114°25'E (WAM); Horrick's Beach, N. of Geraldton; Exmouth Gulf; Pt.Samson (all coll.Marrow).



Figs. 6-12. 6-10. *Nassarius(Alectrion)glans particeps* (Hedley). 6. Holotype AMS No. C-32708; 24.0 mm. 7. Specimen from Long reef, Sydney; 22.7 mm. 8. Broad form with ledged sutures from Port Lincoln, Sth.Australia; 23.7 mm. 9. Broad form with non-ledged sutures from Woodman's Pt., Cockburn Sound, W.Australia; 22.2 mm. 10. Inflated form from Horrock's Beach, N. of Geraldton, W.Australia; 18.2 mm. 11,12. Hybrid specimen of *glans* x *particeps* from Noorea's reef, Regnard Bay, W.Australia; 17.4 mm.

Dubious record: New Zealand: Cavalli I (coll.Powell).
(Barrel-shaped form of *glans particeps)*. Western Australia: E. of Cheyne Bay, 34°55'S & 119°00'E, 75 m (AMS); Frenchman's Bay, Albany (NMV); Princess Royal Harbour, Albany; S.side of Two People's Bay near Albany (both AMS); Margaret River (NZGS); Cowaramup Bay (coll.Hansen); Yallingup (coll.Gardner); Geographe Bay (NMV); off Dunsborough, S.side of Pt.Peron, 48 km S. of Perth (AMS); Woodman's Pt., Cockburn Sound (AMS; NMV); Robb's jetty, Fremantle (NMV); Leighton's Beach near Fremantle (coll.Hansen); Thomson's Bay, N.E. side of Rottnest I (AMS); Garden I, Fremantle (coll.Marrow); Trigg's I Beach, N. of Fremantle (coll.Hansen); Rottnest I; North Beach, Perth; Yanchep (all NMV); Green Head (coll.Marrow); Geraldton (AMS; NMV); Horrock's Beach; Port Hedland; Little Sandy I, N. of Rat I, Houtman Abrolhos Archipelago (all AMS).

The subspecies *N.(A.) glans particeps* is the southern Australian temperate water representative of the tropical Indo-Pacific *N.(A.)glans glans* (Linnaeus), and ranges from Lat.21°S southward along the southern coast of the continent. At the western and eastern faunal region overlap zones (off Proserpine, Queensland and at Exmouth Gulf, Western Australia) both subspecies are sympatric and although interbreeding does not appear to be frequent, some hybrids are occasionally encountered (Figs. 11,12). The tropical *N.glans glans* is larger in size, more solid and elongate with a more shining texture, usually nodose sutures and the violet cast is absent.

Along the southern and western coast of Australia a cline of *N.glans particeps* develops which becomes more frequent towards western Australia. At Port Lincoln, Sth.Australia, specimens are already considerably more inflated and rotund but the sutures still remain narrowly ledged. At Smoky Bay, Sth.Australia, the sutural ledge disappears and the barrel-shape becomes more pronounced. Further towards the west the barrel-shaped form becomes the more frequent form of *particeps* but both forms are sympatric at Albany, Cockburn Sound and Exmouth Gulf.

Recent authors usually consider the south and western Australian rotund form of *particeps* to be a separate species and list it under the erroneous name of *"Nassarius rufulus* Kiener". Kiener (1834-41) described an inflated form of *Nassarius mutabilis* (Linnaeus,1758) under the new name *Buccinum rufulum* and appended the locality "Mediterranean" with a question mark. A.Adams (1852-53) originated the confusion by assigning *"Nassa rufula* Kiener" to "Swan River" (= Western Australia) and in this he is followed by Reeve (1853-54) who illustrates the rotund form of *particeps* under the name *Nassa rufula* and repeats Adams' "Swan River" locality. Deshayes & Edwards (1844) discuss *Buccinum rufulum* Kiener, and correctly assign it, together with Tryon (1882), to the synonymy of the Mediterranean *Nassarius mutabilis* (Linnaeus).

Considerable doubt exists that *N.glans particeps* really lives in New Zealand. Suter (1913-15) reported the species from west of Cuvier I, New Zealand and also the Kermadec Islands. Powell (1952) suggested that Suter's illustration of the species was based on an Australian example and not the Cuvier Island shell, and the Kermadec Island record is probably based on specimens of *N.spiratus* (A.Adams). However, Powell *(op.cit.)* himself reported *particeps* from Cavalli I, New Zealand, on the basis of an immature individual from the La Roche collection, and later (Powell 1976) added "Matapouri" as a

second New Zealand locality. It is probable that an Australian example of *particeps* found its way into the La Roche collection, while Powell's "Matapouri" record was based on a dead individual received by Mrs. I. Powell in an accumulation of shells collected at Matapouri by another collector and thus its real origin remains uncertain. No documented New Zealand specimens of *N.glans particeps* are to be found in any New Zealand or Australian Museum and the species has not been encountered in New Zealand by local collectors.

Nassarius (Alectrion) psila (Watson,1882) (Fig. 13)

1882. *Nassa psila* Watson, J.Linn.Soc.Lond. 16:364.
1886. *Nassa(Alectrion)psila* Watson, Rept.Sci.Res.Voy.H.M.S."Challenger" 15:179,pl.11, figs.4a-c.
1979. *Nassarius(Zeuxis)psila* (Watson), Cernohorsky,Trop.Pacific Mar.shells p.88,pl.27,fig.6 (figd.holotype).

Shell 19.0 mm in length, thin and translucent, sutures narrowly ledged, teleoconch of 6 slightly convex whorls, protoconch of 3 glassy, keeled embryonic whorls. Post-embryonic whorls with slanting, slender axial ribs and sutural gemmules, penultimate whorl with 28 ribs which become progressively obsolete and finally absent on the body whorl; upper spire whorls with weak spiral grooves in interspaces, last two whorls with occasionally obsolete spiral rows of small pits, base of shell with 14 low spiral cords, body whorl suture with a fine sutural girdle. Aperture finely striate within, outer lip and columella edentulous, lower half of columella laminate. Translucent white, body whorl with 2 brown bands.

TYPE LOCALITY. St.185B, Raine I, Torres Strait, Australia, 11°38'15"S & 143°59'38"E, 155 fathoms (284 m), coral sand.

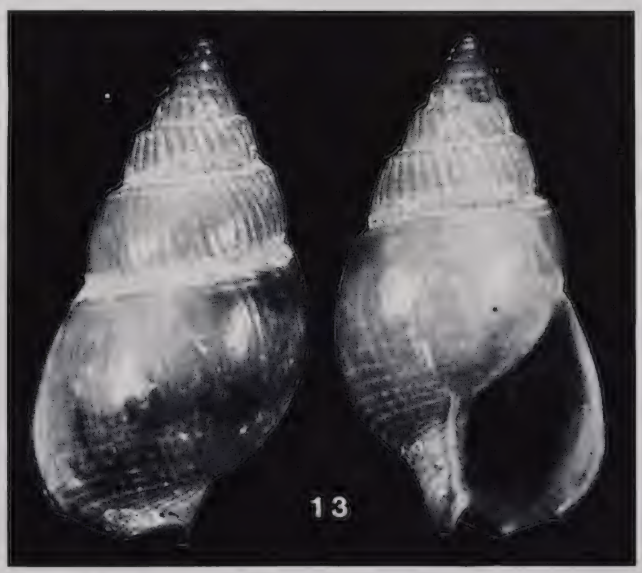


Fig. 13. *Nassarius(Alectrion)psila* (Watson). Holotype BMNH No.1887.2.9.636.; 9.0 mm.

DISTRIBUTION. Known only from the type locality.

Type specimens. The holotype of *N.(A.)psila* is in the BMNH No.1887.2.9.636., dimensions 19.0 x 10.0 mm (Fig. 13).

The species is known only from the holotype. It superficially resembles *N.glans glans* (Linnaeus) but apart from other differences *N.glans* has 1½-1¾ embryonic whorls whereas *N.psila* has 3.

Subgenus **Plicarcularia** Thiele, 1929

Plicarcularia Thiele,1929, Handb.syst.Weicht. p.324. Type species by M *Nassa thersites* Bruguiére = *Buccinum pullus* Linnaeus,1758. Recent, Indo-Pacific.

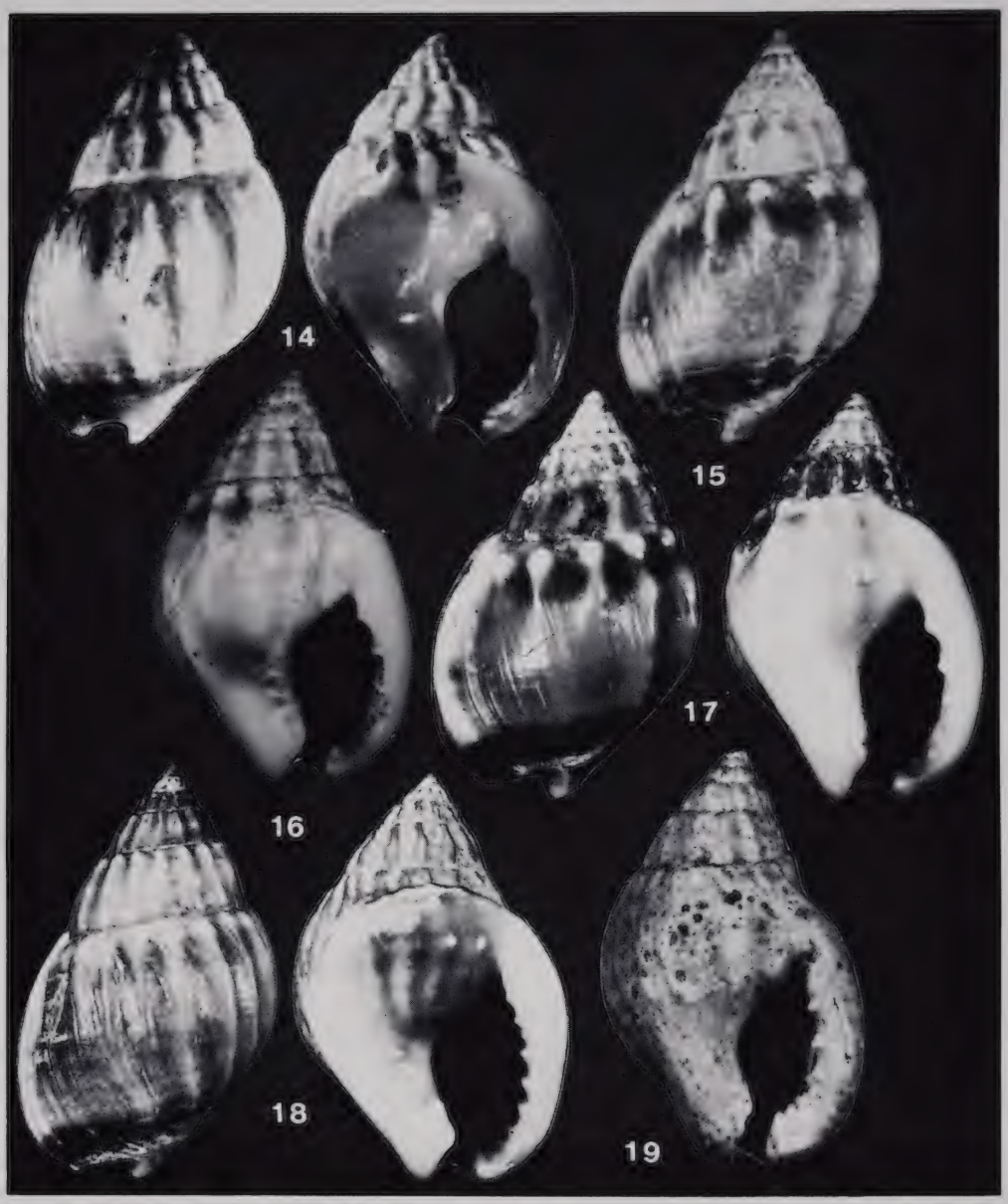
1826. *Eione* Risso, Hist.nat.Eur.merid. 4:171. Type species by SD (Herrmansen, 1847) *Buccinum gibbosulum* Linnaeus,1758. Recent, Mediterranean. (Non *Eione* Rafinesque,1814).
1936. *Parcanassa* Iredale, Rec.Austral.Mus. 19:322. Type species by OD *P.ellana* Iredale,1936 = *Buccinum burchardi* Dunker in Philippi,1849. Recent, S.E. Australia.
1956. *Austronassaria* C. & J. Laseron, Proc.R.Zool.Soc.N.S.W.,Marine Zool. p.71. Type species by M *A.simplex* C. & J.Laseron,1956 (non S.V. Wood,1872) = *Buccinum jonasii* Dunker,1846. Recent, S.E. Australia.
1969. *Retiarcularia* Shuto, Mem.Fac.Sci.Kyushu Univ.(D),Geol. 19:23 (nom.nud.).
1969. *Chelenassa* Shuto, Mem.Fac.Sci.Kyushu Univ.(D),Geol. 19:142. Type species by OD *Nassarius(Chelenassa)elegantissimus* Shuto,1969. Neogene of Philippines.

Species of the subgenus *Plicarcularia* differ from species of *Nassarius s.str.* in its smaller size, elongate-ovate shape and larger columellar callus which is generally spreading in a longitudinal direction, and a constricted aperture. The inner cusp of the lateral tooth of the radula has a tendency to become denticulate on the outer cutting edge, but at least two species have simple cusps as in *Nassarius s.str.* The genus-group *Austronassaria* has been based on a very worn and juvenile specimen of *N.jonasii* (Dunker,1846).

Only two species are known from southern Australia and the subgenus is unknown in New Zealand.

Nassarius (Plicarcularia) burchardi (Dunker in Philippi,1849) (Figs. 14-19)

1849. *Buccinum burchardi* Dunker in Philippi, Abb.Beschr.Conchyl. 3:69,pl.2, fig.14.
1852. *Nassa labecula* A.Adams, Proc.Zool.Soc.Lond. p.98; 1898 Pritchard & Gatliff, Proc.R.Soc.Victoria 11:279.
1868. *Nassa(Arcularia)labecula* A.Adams, Cox, Exch. List.Land.&Mar.shells Aust. p.5.
1901. *Nassa burchardi* Dunker, Tate & May, Proc.Linn.Soc.N.S.W. pt.3:358.
1918. *Nassarius burchardi* Dunker,Hedley, J.Proc.R.Soc.N.S.W. 51:M88; 1921 May, Checklist Moll.Tasmania p.82; 1923 May, Illust.Index Tasmanian shells p.81,pl.38,fig.12; 1932 Cotton & Godfrey, Sth.Austral.Nat.13:94, pl.1,fig.2; 1974 Poore & Rainer, Austral.J.Mar.Freshw.Res.25(3): 378: 1980 Roberts & Wells, Rec.W.Austral.Mus. 8(3):345.
1936. *Parcanassa ellana* Iredale, Rec.Austral.Mus. 19:322; 1962 Iredale & McMichael, Austral.Mus.Mem. No.11:67; 1969 Garrard, J.Malac.Soc. Australia No.12:67 (synonymized with *B.burchardi* Dunker).



Figs. 14-19. *Nassarius(Plicarcularia)burchardi* (Dunker in Philippi). 14. Holotype ZMHU; 8.4 mm (photo courtesy ZMHU). 15,16. Lectotype of *Nassa labecula* A.Adams. BMNH No. 197344; 11.0 mm. 17. Probable syntype of *Parcanassa ellana* Iredale. AMS No C-12999 9.0 mm. 18. Specimen from Clontarf, Sydney; 13.0 mm. 19. Specimen from Gippsland, Victoria.? Pliocene. Tate coll. SAM No.T-581; 8.5 mm.

1955. *Parcanassa burchardi* Dunker, Cotton, R.Soc.Sth.Austral.Malac.Soc. No.7:2,fig.6; 1962 Macpherson & Gabriel, Mar.Moll.Victoria Handb. No.2:195, textfig.232; 1958 Kershaw, J.Malac.Soc.Australia No.2:87.

1961. *Nassarius(Parcanassa)ellana* Iredale, Rippingale & McMichael, Queensl. & Gt.Barrier reef shells p.105,pl.13,fig.18.

1972. *Nassarius(Plicarcularia)burchardi* (Dunker in Philippi), Cernohorsky, Rec.Auckland Inst.Mus. 9:139,figs.31,32 (shell), fig.56 (radula).

Shell up to 15.0 mm in length, solid, teleoconch of 5 convex whorls, protoconch of 2-2¼ smooth embryonic whorls. Sculptured with slender but slightly swollen and often corrugated axial ribs which number 10-17 on the penultimate and 9-20 on the body whorl; axial ribs somewhat nodulose at sutures and becoming weak or obsolete on the dorsum towards the outer lip. Interspaces between ribs smooth, but some individuals have 2 weak spirals on the penultimate whorl and the lower half of the body whorl bears 3-7 spiral threads. Columellar callus orbicular and expanded, reaching body whorl suture but thinner above the parietal wall where axial ribs are protruding through the callus glaze; anterior of columella with 2-5 small denticles, edge of outer lip either smooth or with up to 9 denticles; denticles whenever present, are confined to the margin of the outer lip and the interior of the aperture is smooth. Light to dark brown in colour, penultimate whorl with a sutural band and an additional brown band at the base; columellar callus flushed with yellowish-brown, interior of aperture white, yellow or brown, inside of siphonal canal usually violet. Operculum yellowish-brown, margins serrate or almost smooth.

Rachidians of radula with 12-14 denticles, small accessory plate present, lateral tooth bicuspid.

TYPE LOCALITY. Adelaide, South Australia *(burchardi);* Burias I, Philippines, 6 fathoms (11 m) = error *(labecula);* None *(ellana;* "Stradbroke I" on label accompanying syntypes).

DISTRIBUTION. From Townsville, Queensland, along the east Australian coast to Tasmania and along the south Australian coast to near Fremantle, S.W. Australia. In lagoons and estuaries, 0-100 m.

Type specimens. The holotype of *N.(P.) burchardi* is in the ZMHU, dimensions 8.4 x 5.8 mm (Fig. 14). Three syntypes of *N.labecula* are in the BMNH No. 197344, dimensions of illustrated syntype, here selected as the lectotype, 11.0 x 7.1 mm (Figs. 15,16). Nine probable syntypes of *N.ellana* are in the AMS No.C-12999, dimensions of illustrated syntype 9.0 x 5.8 mm (Fig. 17).

Material examined. Queensland: Palleranda Beach and Strand, Townsville; mouth of Funnel Creek, Sarina; Heron I; Calliope River estuary, Port Curtis; Yeppoon; Pt.Vernon, Eli Creek and Pialba, all Hervey Bay (all AMS); Urangan (NZGS); Tin Can Bay, N.E. of Gympie; Noosa Inlet; Maroochydore; Caloundra; Sangate, Cleveland and Scarborough, all Moreton Bay (all AMS); Stradbroke I, Moreton Bay (AIM); 3.2 km S.E. of Redland Bay jetty, Moreton Bay, 27°37'S & 153°19'E, 4 m; Southport; Coolangatta (all AMS); New South Wales: off Tweed Heads; Ballina Beach; Newcastle; Angourie; Smith's Lake, S. of Forster; Merewether Beach, Newcastle; Norah Head; Wangi Pt., Lake Macquarie; Towoon, near The Entrance; Prickly Pt., Hawkesbury River, 11 m; Pittwater, Broken Bay; Pittwater Basin (all AMS); Palm Beach (NMV); Narrabeen Lake; Long reef, Collaroy; Lane Cove River; Parramatta River, Port Jackson (all AMS); Port Jackson, 4 m

(ZMC); off Mort's Dock, Balmain, 7 m; Queenscliff lagoon, Sydney; Willoughby Bay, Middle Harbour, Sydney; Botany Bay, 6 m; Gunnamatta Bay, Port Hacking; Port Kembla (all AMS); Kelly's Bay, Lake Illawarra; Hare Bay, Jervis Bay; Burrill Lake near Ulladulla; Sussex Inlet; Pambula Lake; Budgewa Beach; Cooks River; Wollaga Lake, 100 m; Merimbula Estuary; Wagonga River; Richmond River Beach (all AMS); Wooli (NMV); Victoria: Mallacoota Inlet (AMS); Port Melbourne; Altona; North Arm, Lakes Entrance; Port Phillip; off Rhyll, Westport (all NMV); Hobson's Bay (NZGS); South Australia: Arno Bay; Larg's Nth.Beach, *c.* 19 km N. of Adelaide (both AMS); Port Adelaide River; Larg's Bay (both NMV); Outer Harbour, Adelaide (coll.Powell); Beachport (NZGS); Tasmania: Swan Pt. (NMV); Tamar River (NZGS); Taroona; Margate; Tinderbox (all TMAG); Western Australia: Penguin I, 32°18'S & 115°41'E (AMS); Oyster Harbour and Princess Royal Harbour, Albany area (Roberts & Wells 1980).

Fossil records: Pliocene: Gippsland, Victoria (SAM); Pleistocene: Minim Cove, Mosman Park, Swan River (AMS); Peppermint Grove; Perth Water; Melville Water (all Reath 1925).

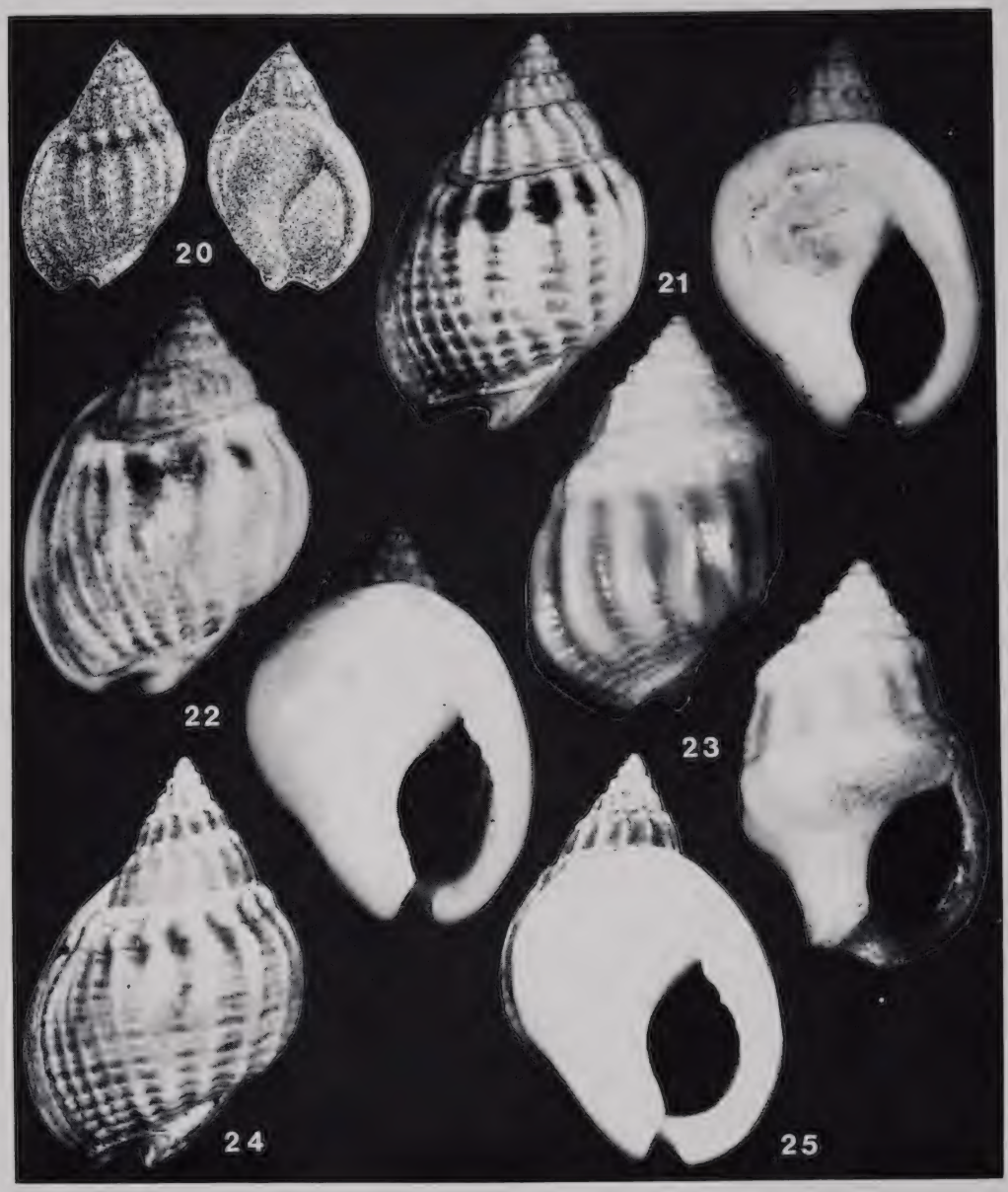
N.burchardi is occasionally confused with *N.jonasii* but differs from the latter in its smooth appearance, lack of strong spiral cords, axial ribs which protrude through the parietal callus shield and the ever present brown basal band on the dorsal side of the body whorl.

Nassarius (Plicarcularia) jonasii (Dunker,1846) (Figs. 20-27)

1846. *Buccinum jonasii* Dunker, Zeit.f.Malakozool. 3:171; 1849 Philippi, Abb. Beschr.Conchyl. 3:66,pl.2,fig.10.
1852. *Nassa cancellata* A.Adams, Proc.Zool.Soc.Lond. p.99; 1853 Reeve, Conch. Icon. 8:pl.23,figs.155a,b; 1932 Tomlin, Proc.Malac.Soc.Lond. 20:42 (non Lea,1833).
1853. *Nassa mangelioides* Reeve, Conch.Icon. 8:pl.23,figs.152a,b; 1932 Tomlin, Proc.Malac.Soc.Lond. 20:96.
1868. *Nassa(Arcularia)mangeloides (sic)* Reeve, Cox, Exch.List Land & Mar. shells Australia p.5.
1889. *Nassa jonasi* Dunker, Brazier, J.Conch. 6:66.
1915. *Arcularia jonasi* Hedley, Proc.R.Soc.N.S.W. 49:52,textfig.16 (animal).
1918. *Nassarius jonasi* Dunker, Hedley, J.Proc.R.Soc.N.S.W. 51:M8.
1955. *Parcanassa jonasi* Dunker, Cotton, R.Soc.Sth,Austral.Malac.Sect.No.7: 2,fig.7.
1956. *Austronassaria simplex* C. & J. Laseron, Proc.R.Zool.Soc.N.S.W. for 1855: 71,textfigs.1,2; 1962 Iredale & McMichael, Austral.Mus.Mem.No. 11:67 (non *Nassa simplex* S.V.Wood,1872; nec Seguenza 1880).
1962. *Parcanassa jonasi* Dunker, Iredale & McMichael, Austral.Mus.Mem. No.11:67.
1972. *Nassarius(Plicarcularia)jonasii* (Dunker), Cernohorsky, Rec. Auckland Inst.Mus. 9:139,figs.33,34.

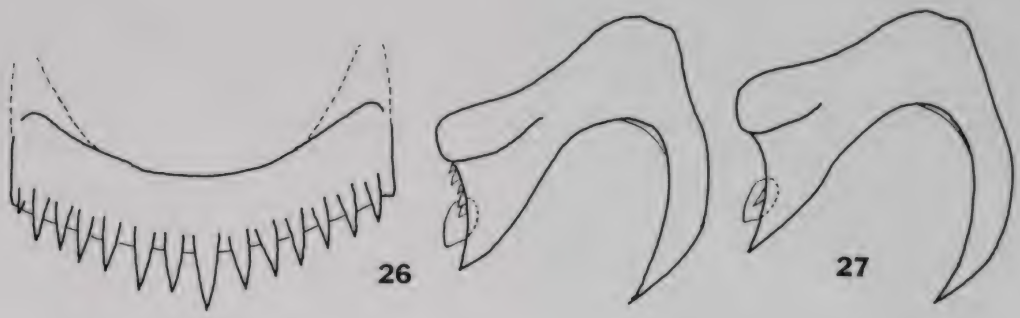
Species similar in size and sculpture to *N.(P.) burchardi* but differs in the following features: interspaces of axial ribs prominently grooved, grooves extending along the entire length of the body whorl forming 4-6 clathrate cords at the base. Columellar callus thicker and more solid, orbicular, reaching, or only slightly extending past the body whorl suture; callus shield completely smooth on the columellar side, lacking the small denticles which are present in *N. burchardi*. Similarly to the latter, the margin of the outer lip either smooth or denticulate. Columellar callus white and not flushed with brown, area above the

parietal wall not thinned as in *N.burchardi* but solid. Fawn to ash-grey rather than brown, interior of aperture brown. Operculum yellowish-brown, margins either simple or very weakly serrated.



Figs 20-25. *Nassarius(Plicarcularia)jonasii* (Dunker). 20. Illustration from Philippi (1874-51, pl.2,fig.10). 21. Lectotype of *Nassa cancellata* A.Adams, BMNH No. 197320; 12.0 mm. 22. Lectotype of *N.mangelioides* Reeve, BMNH (no No.); 11.2 mm. 23. Holotype of *Austronassaria simplex* (C. & J. Laseron), AMS No. C-95244; 9.0 mm. 24,25. Specimen from Shell Harbour, N.S.W., Australia; 13.6 mm.

Rachidians of radula with 13-15 denticles, small ovate accessory plate present, lateral teeth bicuspid, cutting edge of inward pointing cusp with 1-5 minute denticles. (Figs. 26,27).



Figs. 26,27 *Nassarius(Plicarcularia)jonasii* (Dunker). 26. Half-row of radula; off Narrabeen, N.S.W., Australia. 27. Lateral tooth with single side-denticle from same radula.

TYPE LOCALITY. None *(jonasii* and *mangelioides)*; Masbate, Phillippines = error *(cancellata)*.

DISTRIBUTION. From southern Queensland along the east Australian coast to South Australia. Absent from Tasmania and Western Australia. On *Zostera* flats and near river estuaries, 0-100 m.

Type specimens. The type-specimen of *N. jonasii* can no longer be traced in the ZMHU (Dr R. Kilias, *in litt.*) but Philippi's illustration (1847-51, pl.2, fig. 10) (Fig. 20) together with the original description clearly elucidate the species. Three syntypes of *N.cancellata* are in the BMNH No. 197320, and the illustrated syntype, dimensions 12.0 x 7.5 mm (Fig. 21) is here selected as the lectotype. Three syntypes of *N.mangelioides* are in the BMNH (no number), and the illustrated syntype, dimensions 11.2 x 7.3 mm (Fig. 22) is here selected as the lectotype. The holotype of *Austronassaria simplex*, a very worn and juvenile specimen, is in the AMS No. C-95244, dimensions 9.0 x 5.5 mm (Fig. 23).

Material examined. Queensland: Noosa Inlet; Caloundra (both AMS); Burpengary (NMV); Amity Pt., Stradbroke I; 3.2 km S.E. of Redland Bay, 27° 37'S & 153°19'E; Southport (all AMS); New South Wales: Brunswick Heads; Minnie Waters; Woogoolga; Forster; off Nelson Head, Port Stephen; Merewether Beach, Newcastle (all AMS); Balmoral, Sydney (coll. Powell); S. side of The Entrance (NZGS); Toowoon near The Entrance; Woy Woy; Narrabeen Lake (both AMS); Narrabeen (NMV); Clontarf Bay, Port Jackson (AMS); Maroubra (coll. Powell); Gunnamatta Bay; Port Hacking (both AMS); Shellharbour (coll.Powell); off Bermagui; St. George Basin, Sussex Inlet near Jervis Bay; S. side of Ulladulla; Burrill Lake near Ulladulla; Batemans Bay; Wallaga Lake, 100 m (all AMS); off Eden, 37°05'S & 150°05'E, 55-92 m (ZMC); Merimbula Estuary; Cook River; Nudgee River Estuary (all AMS); Victoria: Bekta River, Mallacoota; Gypsy Pt., Mallacoota Inlet (both AMS); Port Phillip; Hopkins River (both NMV); Lorne (AMS; NMV); South Australia: Inverlock (NMV); Outer Harbour, Adelaide (Cotton, 1955).

The species has a very restricted distribution from southern Queensland barely reaching South Australia, and is absent from Tasmania and Western Australia.

Subgenus **Niotha** H. & A. Adams, 1853

Niotha H. & A. Adams, Gen.Rec.Moll. 1:117. Type species by SD (Cossmann, 1901), *Nassa cumingii* A. Adams, 1852 = *Buccinum conoidale* Deshayes in Belanger, 1832. Recent, Indo-pacific.

1936. *Tavaniotha* Iredale, Rec.Austral.Mus. 19:321,337. Type species by OD *Nassa optata* Gould, 1860 = *N. nigella* Reeve, 1854. Recent, S.E. Australia.

Species of the subgenus *Niotha* differ from *Nassarius s.str.* in its smaller size and smaller columellar callus which extends only halfway up the body whorl and frequently tends to thin out above the parietal wall. The radula and operculum are similar to *Nassarius s.str.*

Two living and 4 fossil species are known from Australia but the genus-group is not represented in New Zealand.

Nassarius (Niotha) pauperatus (Lamarck, 1822) (Figs. 28-33)

1822. *Buccinum pauperatum* Lamarck, Hist.nat.anim.s.vert. 7:278; 1834 Kiener, Spéc. gén.icon.coq.viv. 9:90,pl.29,fig.118.

1843. *Buccinum australe* Menke, Moll.Nov.Hollandiae p.21 (non Gmelin, 1791).

1853. *Nassa lirella* "Beck MS", Reeve, Conch.Icon. 8:pl.14,fig.95; 1932 Tomlin, Proc. Malac.Soc.Lond. 20:96.

1853. *Nassa pauperata* (Lamarck), Reeve, Conch.Icon. 8:pl.15,fig.102 and pl.5, fig.27; 1854 Rousseau, Voy.Pole Sud,Zool. 5:83,pl.21,figs.37,38; 1898 Pritchard & Gatliff, Proc.R.Soc.Victoria 11:279; 1901 Tate & May, Proc. Linn.Soc.N.S.W. Pt.3:358.

1868. *Nassa (Niotha) pauperata* (Lamarck), Cox, Exch.List Land & Mar.shells Australia p.5; 1886 Watson,Rept.Sci.Res.Voy.H.M.S."Challenger" 15:176.

1912. *Arcularia pauperata* (Lamarck), Verco, Trans.R.Soc.Sth.Australia 36: 204; 1916 Hedley, J.R.Soc.W.Australia 1:61.

1918. *Nassarius pauperatus* (Lamarck), Hedley, J.Proc.R.Soc.N.S.W. 51:M88; 1921 May, Check-list Moll.Tasmania p.82; 1923 May, Illust.Ind.Tasman. shells, p.81,pl.38,fig.15; 1928 Chapman, Rec.Geol.Surv. Victoria 5:164; 1932 Cotton & Godfrey, Sth.Austral.Nat.13:96,pl.1,fig.4; 1936 Gabriel, Victoria Sea shells p.12, textfig.; 1974 Poore & Rainer, Austral.J. Mar. & Freshw. Res. 25:378; 1980 Roberts & Wells, Rec.W.Austral.Mus. 8(3):345.

1950. *Parcanassa pauperata* (Lamarck), Cotton, Sth.Austral.shells,pl.8,fig. 153; 1955 Cotton, R.Soc.Sth.Austral.Malac.Sect.No.7:2,fig.8; 1958 Kershaw, J.Malac.Soc.Australia No.2:87; 1962 Macpherson & Gabriel, Mar. Moll. Victoria Handb. No.2:193, textfig.231; 1966 Hodgkin *et.al.*, W.Austral.Nat.Club Handb. No.9:43; 1971 Wilson & Gillet, Austral. shells p.102,pl.66,figs.5,5a.

1962. *Tavaniotha pauperata* (Lamarck), Iredale & McMichael, Austral.Mus.Mem. No. 11:67.

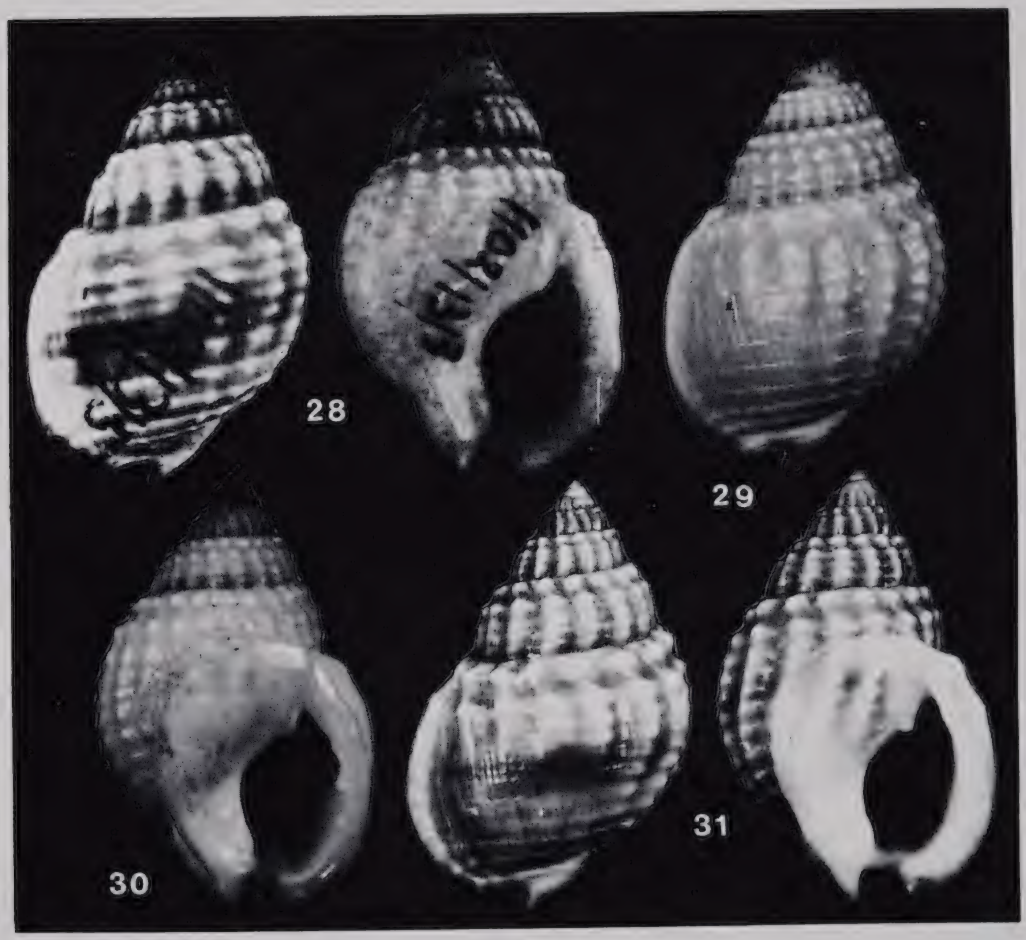
1972. *Nassarius (Niotha) pauperatus* (Lamarck), Cernohorsky, Rec.Auckland Inst. Mus. 9:147,figs.47,48 (shell), fig.55 (protoconch), fig.73 (figd.syntype).

Shell up to 20.0 mm in length, moderately thin and inflated, sculptured with coarse and granulose axial ribs and overriding spiral cords; sutural gemmules separated from the axial ribs by a shallow, smooth channel, ribs becoming obsolete on the dorsal side of the body whorl. Columellar callus orbicular and expanding partly on to body whorl without reaching body whorl suture; callus has a tendency to thin above the parietal wall. Outer lip

backed by a varix, interior of lip either smooth or denticulate, columella with small, prominent or obsolete denticles. Variable in colour, generally creamy-white, ornamented with a broad brown band on the body whorl, some individuals uniformly creamy-white or brown; columellar callus and aperture white, sides of the siphonal canal frequently flushed with dark brown. Operculum yellowish-brown, margins generally serrate but occasionally smooth.

Rachidians of radula with 12-16 denticles, oval accessory plate present, lateral teeth bicuspid, central base with 1-3 small denticles (Figs. 32, 33).

TYPE LOCALITY. None *(pauperatus* and *lirella);* New Holland = Australia *(australe).*



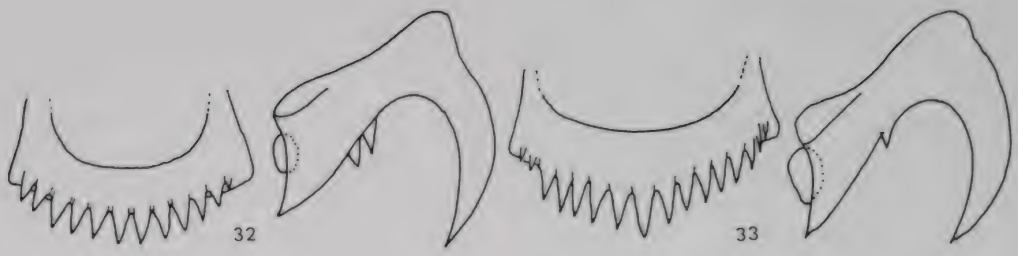
Figs. 28-31. *Nassarius(Niotha)pauperatus* (Lamarck). 28. Probable syntypes MHNG No. 1102/13/5 and 1102/13/3; 15.9 mm and 17.7 mm respectively. 29,30. Lectotype of *Nassa lirella* Reeve, BMNH No. 197361; 17.1 mm. 31. Specimen from Outer Harbour, Adelaide; 17.0 mm.

DISTRIBUTION. From Sydney, New South Wales along the east Australian coast to Tasmania and along the southern coast to Geraldton, Western Australia. Marine and estuarine, on tidal sand-flats, in rock-pools, eel-grass and muddy sand, 0-70 m.

Type specimens. Five probable syntypes of *N. (N.) pauperatus* are in the MHNG No. 1102/13/1-5, dimensions of illustrated syntype No. 1102/13/3 is 17.7 and No.1102/13/5 is 15.9 mm (Fig. 28). According to Rosalie de Lamarck's black ink manuscript annotations on the margins of her fathers personal copy of the seventh volume of the "Histoire naturelle de animaux sans vertebres", Lamarck owned 5 specimens of *N.pauperatus* and the extant material is most probably the type lot. The types of *Buccinum australe* Menke, are no longer traceable. Three syntypes of *N. lirella* are in the BMNH No.197361, and the illustrated syntype, dimensions 17.1 x 10.7 mm, is here selected as the lectotype (Figs. 29, 30).

Material examined. New South Wales: Narooma; Port Jackson; Bermagui (all AMS); Victoria: Inverlock (NMV); Lake Malacoota (AMS); Melbourne (NZGS); St. Kilda Beach; Lakes Entrance (both NMV); Altona Bay (NZGS); Brighton (NMV); Sandringham (USNM); Port Arlington (AMS); Western Beach, Corio Bay, Port Phillip (NZGS); Port Phillip (USNM); S. end of Swan Bay, S.E. of Geelong (AMS); Sorrento (NMV); Portland Bay; Sorrento (both AMS); Rosebud; Port Fairy (both NZGS); San Remo, Western Port (USNM); Rhyll, Phillip I (NMV); Robertson Beach near Pt Albert (AMS); Shallow Inlet (NMV); Corner Inlet, Wilson's Promontory (AMS); South Australia: Ceduna (coll.Powell); St. Peter's I; Streaky Bay (both AMS); Arno Bay (coll. Powell); Tumby Bay; Coffin Bay (both AMS); Pt. Lincoln (AIM; AMS); Salt Creek, Pt. Lincoln (TMAG); Chinaman's Creek, Upper Spencer Gulf (AMS); Hardwick Bay; St Vincent Gulf (both NMV); Bay of Schoals, N.E. Kangaroo I; Larg's North Beach; Glenelg Beach near Adelaide (all AMS); Semaphore (NMV); Semaphore Bay; Mulaton (both coll.Powell); Lang's Beach, Adelaide (AMS); Outer Harbour, Adelaide (USNM); Port Adelaide River (coll.Powell); Holdfast Bay (AMS); Yorke's Peninsula (ZMC); N. of Stansbury, Yorke's Peninsula (coll.Powell); Sultana Bay (USNM); Encounter Bay; American River, Kangaroo I; Beachport (all AMS); Tasmania: Perkin's Bay, West Inlet (TMAG); Stanley (AMS); Black River Beach (NMV); Brickmaker's Beach; Bridport; Flinder I (all AMS); Ulverston (NMV); mouth of Inglis River, Wynyard (TMAG); Launceston (NZGS); Lisdillon; Spring Beach; Prosser River; Earlham; Reidle Bay, Maria I; Blackman Bay near Marion Bay; Midway Pt.; Cambridge (all TMAG); N. of Sanford, S.E. Hobart; Cremorne, W.side of Frederick Henry Bay (both AMS); S. shore of Pipe Clay lagoon (TMAG); Eaglehawk Bay, 43°01'S & 147°51'E (AMS); Rockeby, Ralph's Bay; Ralph's Bay near Sth.Arm; Oyster Cove; Margate Beach; Kettering; Port Arthur; Bond Bay (all TMAG); Port Cygnet (NMV); Simpson's Bay (AMS); Kelly Basin, Port Davey (TMAG); Sister's Beach (NMV); The Neck, Bruny I; Catermaran (both TMAG); Blackwood River (NMV); Hawley; Piper's Heads; White Beach, Mbeena (all TMAG); Western Australia: King George Sound; Oyster Harbour, S. side of Emu Pt., Albany (both AMS); Augusta (coll.Marrow); Geographe Bay (AMS); Leighton Beach near Fremantle (coll. Hansen); Rottnest I (AMS); Cottesloe Beach, Perth (NZGS); Irwin River, S. of Geraldton (AMS).
Fossil record: Pleistocene: Sorrento Bore, Mornington Peninsula, Victoria, depth 489 feet (149 m) [Chapman 1928].

N.(N.) pauperatus is a common intertidal species. Estuarine forms are frequently uniformly brown in colour.



Figs. 32,33 *Nassarius(Niotha)pauperatus* (Lamarck). Half-row of radula. Two specimens from Rosebud, Victoria, Australia.

Nassarius (Niotha) nigellus (Reeve, 1854) (Figs. 34-39)

1846. *Buccinum semigranosum* Dunker, Zeit.f.Malakozool. 3:170; 1849 Philippi, Abb.Beschr.Conchyl. 3:45,68, pl.1,figs.9a-c and pl.2,fig.12; 1858 Kuester, Martini & Chemnitz Syst.Conchyl.-Cab. 3(1):27,pl.6,figs. 13-15 (non Wood, 1828).
1853. *Nassa semigranosa* Dunker, Reeve, Conch.Icon. 8:pl.17,fig.116.
1854. *Nassa nigella* Reeve, Conch.Icon. 8:pl.26,figs.173a,b; 1932 Tomlin, Proc. Malac.Soc.Lond. 20:96.
1860. *Nassa optata* Gould, Proc.Boston Soc.Nat.Hist. 7:331; 1878 Tenison-Woods, Proc. Linn.Soc.N.S.W. 2:257; 1964 Johnson, U.S.Nat.Mus.Bull.No.239:119,pl.16,fig.4 (figd.lectotype).
1864. *Nassa munieriana* Crosse, J. Conchyl. 12:345,pl.13,fig.6; 1932 Tomlin, Proc. Malac.Soc.Lond. 20:96.
1876. *Nassa tasmanica* Tenison-Woods, Proc.R.Soc.Tasmania 39:737,pl.84,fig.81.
1880. *Nassa peritrema* Tenison-Woods, Proc.Linn.Soc.N.S.W. 4:21,pl.4,figs. 5,5a; 1903 Hedley, Mem.Austral.Mus. 4:377.
1898. *Nassa jacksoniana* Q. & G., Pritchard & Gatliff, Proc.R.Soc.Victoria 11:278; 1903 Hedley, Mem.Austral.Mus. 4:377 (non *Buccinum jacksonianum* Quoy & Gaimard, 1883 = *Nassarius).*
1915. *Arcularia semigranosa* Dunker, Hedley, Proc.Linn.Soc.N.S.W. 39:735, pl.83,fig.78 (figd.type specimen of *Nassa optata* Gould).
1915. *Arcularia tasmanica* T.-W., Hedley, Proc.Linn.Soc.N.S.W. 39:737,pl.84,fig.81.
1918. *Nassarius peritrema* T.-W., Hedley, J.Proc.R.Soc.N.S.W. 51:M88.
1918. *Nassarius semigranosus nigellus* Hedley, J.Proc.R.Soc.N.S.W. 51:M88.
1921. *Nassarius semigranosus* Dunker, May, Check-list Moll. Tasmania p.82; 1923 May, Illust.Ind.Tasman.shells p.81,pl.38,fig.16; 1924 Iredale, Proc.Linn.Soc.N.S.W. 49:270.
1924. *Nassarius tasmanicus* (T.-W.), Iredale, Proc.Linn.Soc.N.S.W. 49:271; 1932 Cotton & Godfrey, Sth.Austral.Nat. 13:97.
1932. *Nassarius nigellus* (Reeve), Cotton & Godfrey, Sth.Austral.Nat. 13:97; 1974 Poore & Rainer, Austral.J.Mar. & Freshw.Res. 25(3):378; 1980 Roberts & Wells, Rec.W.Austral.Mus. 8(3):345; 1980 Editor, Austral. Shell News No.'s 28/29:2, textfigs.
1932. *Nassarius munieriana* Crosse, Cotton & Godfrey, Sth.Austral.Nat. 13:97.
1955. *Tavaniotha optata* (Gould), Cotton, R.Soc.Sth.Austral.Malac.Sect.No.7: 2,fig.2; 1962 Iredale & McMichael, Austral.Mus.Mem. No.11:67; 1962 Macpherson & Gabriel, Mar.Moll.Victoria Handb. No.2:195.
1955 *Tavaniotha munieriana* Crosse, Cotton, R.Soc.Sth.Austral.Malac.Sect.No.7:2,fig.5.
1962. *Tavaniotha nigella* (Reeve), Iredale & McMichael, Austral.Mus.Mem. No.11:67.
1962. *Tavaniotha nigella tasmanica* (T.-W.), Iredale & McMichael, *ibid.*No.11:67.
1962. *Tavaniotha optata munieriana* (Crosse), Iredale & McMichael, *ibid.*No.11:67.

1962. *Tavaniotha peritrema* (T.-W.), Iredale & McMichael, *ibid.* No.11:67.
1972. *Nassarius (Niotha) nigellus* (Reeve), Cernohorsky, Rec.Auckland Inst.Mus. 9:148, figs.49,50 (shell), fig.54 (protoconch), figs.64-66 (radulae).

Shell superficially similar to *N.(N.) pauperatus* (Lamarck), up to 13.0 mm in length, thinner and less bulbous at the body whorl, axial ribs on spire whorls more distinctly angulate on presutural ramp, sculpture finer and more discreet. Outer lip either smooth or denticulate, columellar callus orbicular and not thinning in adult specimens. Protoconchs slightly different, that of *N.nigellus* being convexly bulbous with first post-embryonic whorls axially striate; protoconch of *N.pauperatus* more button-shaped with first post-embryonic whorls heavily ribbed. Uniformly cream in colour, some individuals light to dark brown or occasionally banded with brown; aperture and columellar callus white or flushed with brown.

Rachidians of radula with 9-19 denticles, ovate accessory plate present, lateral teeth bicuspid, cutting edge of the inward pointing cusp and the basal edge between the two cusps denticulate; number of denticles varies 1-3.

TYPE LOCALITY. New Zealand = error *(nigellus)*: none *(semigranosum)*; Sydney Harbour, N.S.W. *(optata)*; Gulf of St. Vincent, Sth.Australia *(munieriana)*; Nth.Tasmania *(tasmanica)*; Sow & Pigs, Port Jackson, N.S.W. *(peritrema)*. Sydney Harbour, N.S.W., is here designated as the type locality of *N.(N.) nigellus*.

DISTRIBUTION. From Cairns, Queensland, along the east coast to Lord Howe I, to Tasmania, and along the southern coast to Fremantle, Western Australia. On mud and sand-flats and in sand, 3-183 m.

Type specimens. Three syntypes of *N.(N.) nigellus* are in the BMNH No.197352, and the illustrated syntype, dimensions 11.5 x 6.8 mm, is here selected as the lectotype (Fig. 34). The lectotype of *N.optata* is in the MCZ No. 169270, dimensions 10.6 x 5.6 mm (Fig. 36). Seven syntypes of *N.munieriana* are in the BMNH No.1871.7.8.3., and the illustrated syntype, dimensions 13.5 x 7.8 mm, is here selected as the lectotype (Fig. 37). Three syntypes of *N.tasmanica* are in TMAG No.E-784 (old No. TM-5294), and the

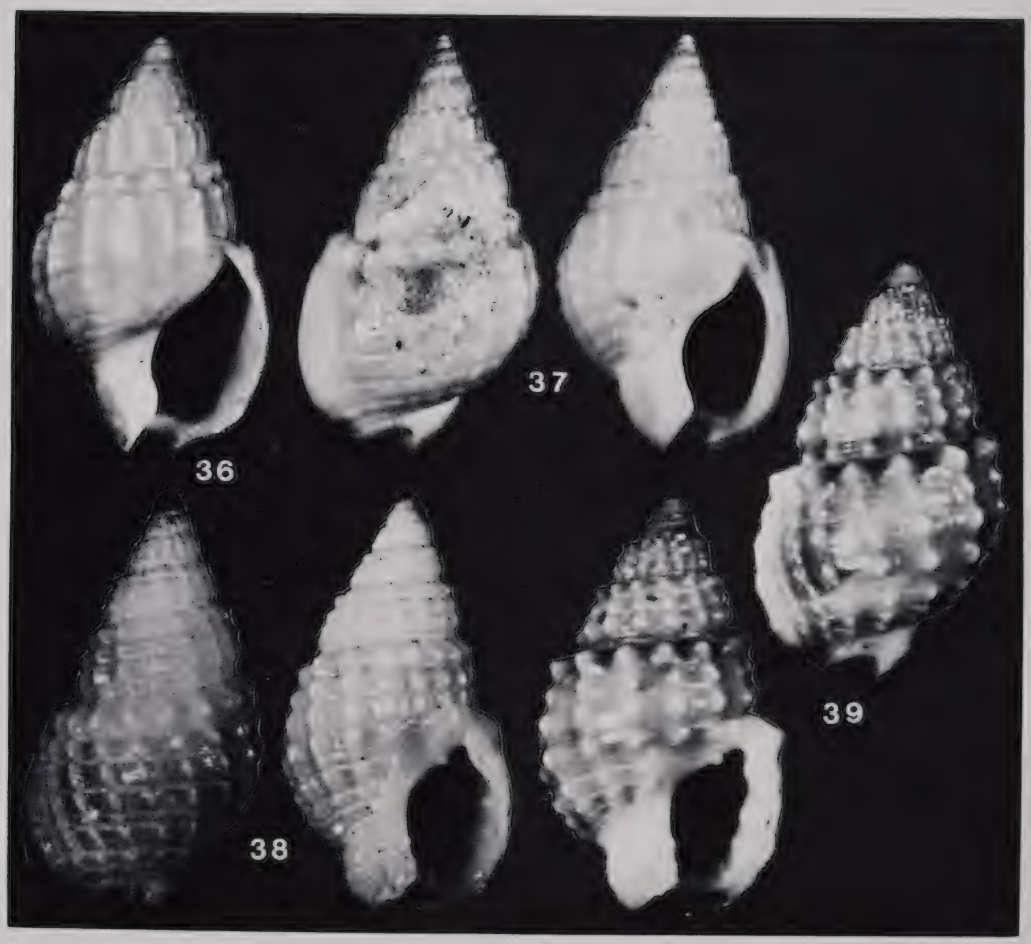
Figs. 34,35. *Nassarius(Niotha)nigellus* (Reeve). 34. Lectotype BMNH No. 197352; 11.5 mm. 35. Lectotype of *Nassa tasmanica* Tenison-Woods, TMAG No. E-784: 11.8 mm.

illustrated syntype, dimensions 11.8 x 7.3 mm, is here selected as the lectotype (Fig. 35). Two syntypes of *N.peritrema* from Port Jackson (ex-John Brazier) are in the ANSP No.16369, dimensions of illustrated syntype 7.8 x 4.0 mm (Fig. 38).

Material examined. Queensland: Buchan's Pt., N. of Cairns; Bowen; Tannum Sands, S.E. Gladstone; off Wide Bay, 64 m; Shoal Bay Rocks, Keppel Bay; Four Mile Beach, Port Douglas; Zilzie, Keppel Bay; Dundowran Beach, Harvey Bay; Yepoon; 27 km N.E. of North reef, 23°08'S & 152°12'E, 115 m (all AMS); Shelley Beach, Caloundra (coll.Whitehead); Caloundra (AIM); Alexandra Head; off Cape Moreton, 128-183 m (both AMS); Cape Moreton, 117 m (AIM); off Jumpin Pin Bar, 37-55 m (AMS); New South Wales: Ballina (NZGS); Richmond River Beach; Clarence River; 8 km E. of Woody Head, 41 m; Shelley Beach, S. of Angourie; Coff's Harbour; S. of Smoky Bay, 31°05'S & 153°03'E, 15 m; Port Macquarie; off Manning River; 17 km N.W. of Crowdy Head, 91 m; off Port Stephen, 45-73 m; Newcastle Bight, 44-48 m; Merewether Beach, Newcastle; Patanga, Broken Bay; Woy Woy; Broken Bay, 82 m (all AMS); Twofold Bay; Maroubra (both AIM); 2 km E. of Little Bay, Sydney, 33°59'S & 151°16'E, 45 m; Chinaman's Beach near Balmoral Sydney; Kurnell, Botany Bay (all AMS); Watson's Bay, Port Jackson, 5-9 m (ZMC); off Cronulla, 60-100 m (coll.Powell); E. of Bate Bay, N. of Port Hacking, 75 m; Coolcliff (both AMS); Shellharbour (coll.Powell); Hyam's Beach, Jervis Bay (NZGS); Sussex Inlet reef, Wreck Bay; off Brush I, S. of Ulladulla, 55-73 m (both AMS); off Eden, 37°05'S & 105°05'E, 55-92 m; Eden Bay; Disaster Bay, 55-73 m (all ZMC); off Port Kembla, 82 m; 4 km off Pt.Jibbon, 73 m (both AMS); Victoria: Gabo I, 28 m; off Monumental Bay, Gabo I, 15-18 m; Mallacoota; Mt.Cann; off Cape Everard, 128-146 m; off Lakes Entrance (all AMS); Sandringham; between Gabo I and Flinders I (both NMV); Mordialloc; Rickett's Pt., Port Phillip; between Cape Hawe and Lakes Entrance, 38°13'S & 149°06'E, 146-158 m (all AMS); Hastings (NMV); Rosebud (coll.Powell); Port Fairy (AIM); Western Port (ZMC); Warmeet Channel, Western Port Bay, 4 m; between Eagle Rock and Crawfish Rock, Western Port Bay, 3 m; Flinders, Western Port; Lorne; Walkerville, Waratah Bay (all AMS); Port Winstun (ZMC); Tasmania: 32 km E. of Babel I, Bass Str., 118 m; E. of Grassy, King I; Brickmakers Beach near Rocky Cape (all AMS); E. end of Black River Beach (NZGS); Woody I; Earlham; Stanley; Coles Bay; West Pt., Marrawah; Thunder & Lightning Bay, Barren I; N.E. of Barren I, 47 m; Cape Barren I (all TMAG); Somerset (AMS); Green's Beach; between Pardoe Pt. and Pt.Sorrell; Long Beach, Tamar River (all TMAG); S. of St.Helen's Pt., 41°30'S & 148°17'E, 31 m; off Piccaninny Pt; N. of Bicheno, 41°40'S & 148°17'E, 31 m; Rockeby, Derwent Estuary (all AMS); 32 km S. of Refugee I, 13-15 m; N. of Oyster Bay, Maria I; Sth.Blackman's Bay; Sandy Oceans Beach, Marion Bay; Primrose Sands, Carlton (all TMAG); Hobart (AMS); Sandy Bay, Hobart (TMAG); Princess Pier, Hobart; Cremorne (both AMS); Roches Beach, Frederick Henry Bay; Taroona; Margate Beach (all TMAG); Roberts Pt., 43°08'S & 147°15'E, 18-25 m (AMS); Port Arthur (AIM); D'Entrecasteaux Channel; Mills reef, W. coast of Bruny I (both AMS); Kelly Basin, Port Davey; Whales Cove, Port Davey; Great Taylor Bay; Cooks Beach; Tinderbox (all TMAG); South Australia: Pt.Sinclair, 40 m; Smoky Bay, 73 m (both coll.Marrow); Great Australian Bight, 36°00'S & 138°21'E, 64 m (coll.Powell); Aldinga Beach, S. of Noarlunga (AMS); Aldinga Bay; Encounter Bay (both NMV); E. of Kangaroo I, 64 m (coll.Powell); Beachport; Semaphore Beach (both AMS); Western Australia: off Nubeena, King George Sound; Beach near railway station, Albany; Emu Pt., Albany; Cheyne Beach, *c*. 48 km E. of Albany; Margaret River mouth; between Eucla and Esperance, 75-293 m; Cockburn

Sound, 20 m (all AMS); Peppermint Grove (coll.Marrow); Mosman Beach, Cottesloe (WAM); Lord Howe Island: off the coast, 31°34'S & 159°00'E, 73 m (AMS).
Fossil record: Pleistocene: Paulik's Bore, Semple Road, Jandakot, 39.3 m, Perth Basin; Bebich's Bore, Barfield Road, Thompson's Lake, 39.6 m; spoil from drain, S. side Bussell Highway, Vasse; Eaton's Bore, 240 Wharf Street, Queen's Park, 15.2 - 18.3 m (all WAM).

The species is extremely variable in shape and sculpture and the various forms described have been discussed in detail by Cernohorsky (1972). Malformation in Nassariidae appears to be more frequent than in other Neogastropod groups and a malformed specimen of *N.nigellus* has been recently illustrated (The Editor 1980).



Figs. 36-39. *Nassarius(Niotha)nigellus* (Reeve). 36. Lectotype of *Nassa optata* Gould, MCZ No. 169270; 10.6 mm. 37. Lectotype of *N.munieriana* Crosse, BMNH No. 1871.7.8.3.; 13.5 mm. Syntype of *N.peritrema* Tenison-Woods, ANSP No. 16369; 7.8 mm. 39. Specimen from Cape Moreton, Qld., Australia; 5.3 mm.

Nassarius (Niotha) sublirellus (Tate, 1888) (Fig. 40)

1888. *Nasa (sic) sublirella* Tate, Trans.R.Soc.Sth.Australia 10:171.
1889. *Nassa sublirella* Tate, Trans.Proc.R.Soc.Sth.Australia 11:118,pl.4, fig. 2.
1970. *Niotha sublirella* (Tate), Darragh, Mem.Nat.Mus.Victoria 31:197.

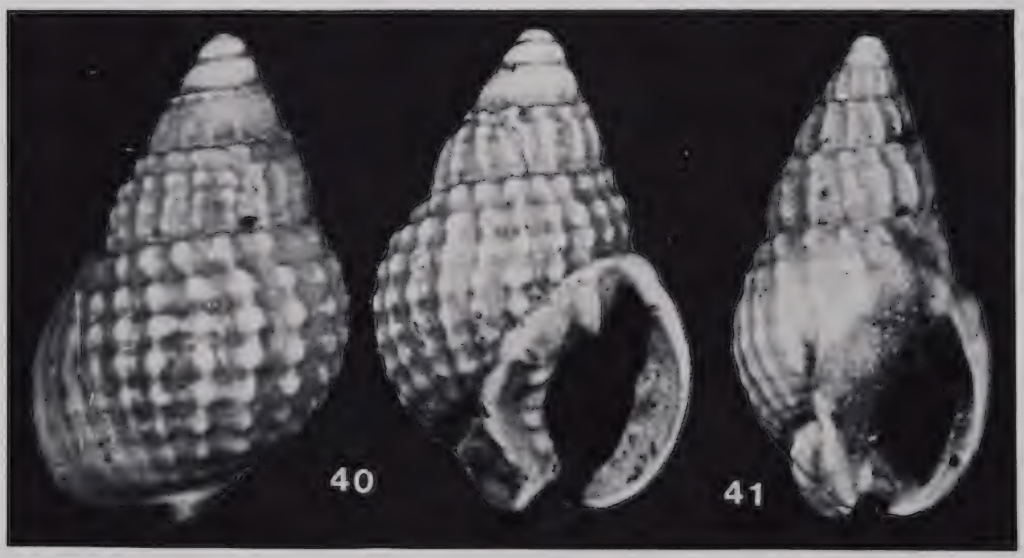
Shell up to 10.0 mm in length, ovate to elongate-ovate, teleoconch of 4¾-5 convex whorls, protoconch of 2¾ smooth embryonic whorls, sutural nodules usually separated from remaining sculpture by a concave trough. Sculptured with *c.* 16 axial ribs and spiral rows of moderately large nodules, penultimate whorls with 4 rows and body whorl with 8-9 rows, siphonal fasciole with a strong oblique cord. Aperture moderately open, outer lip with 4-5 denticles, columellar callus narrowly spreading on to body whorl, lower half of columella with 4-5 strong denticles, parietal denticle prominent.

TYPE LOCALITY. Upper beds at Muddy Creek, Pliocene of Victoria, Australia.

STRATIGRAPHIC RANGE. Kalimnan, L.Pliocene, Victoria, Australia.

Type specimens. Fourteen syntypes of *N.sublirellus* ranging 4.9-9.5 mm, are in the Tate collection, SAM No. T-580. The syntype which has been illustrated by Tate (1889,pl.4,fig.2), dimensions 8.6 x 5.7 mm, is here selected as the lectotype (Fig. 40).

Material examined. Pliocene: Grange Burn near Hamilton, Victoria (AMS).



Figs. 40,41. 40. *Nassarius(Niotha)sublirellus* (Tate). Lectotype Tate Coll. SAM No. T-580; 8.6 mm. 41. *N.(N.) nigellus* (Reeve). Slender syntype of *Nassa sublirella* Tate; 7.6 mm.

N.sublirellus is undoubtedly the forerunner of the Recent *N.nigellus* (Reeve), and the lectotype of *N.sublirellus* closely resembles the form *tasmanica* of *N.nigellus*. *N.sublirellus*, however, differs in the more defined and clearly bordered columellar callus and the more prominent columellar denticles. One of Tate's slender syntypes of *N.sublirellus* (Fig. 41) is the species *N.nigellus* (Reeve).

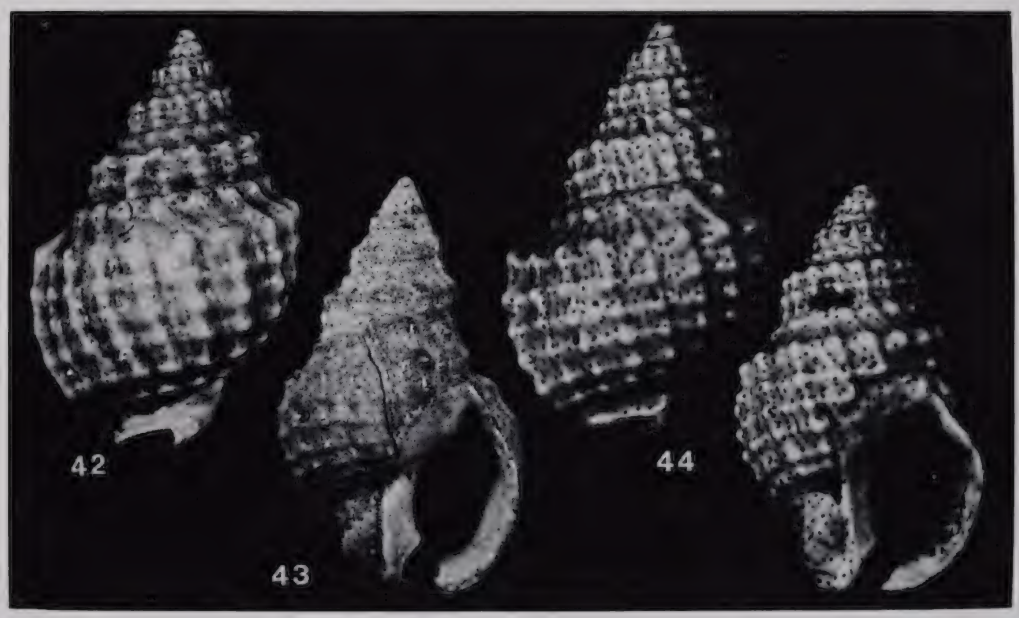
Nassarius (Niotha) crassigranosus (Tate, 1888) (Fig. 42-44)

1888. *Nassa crassigranosa* Tate, Trans.R.Soc.Sth.Australia 10:170,pl.12, figs.6a,b; 1897 Harris, Cat.Tert.Moll.Brit.Mus. Pt.1:168.
1928. *Nassarius crassigranosus* Tate, Chapman, Rec.Geol.Surv.Victoria 5:164.
1970. *Tavaniotha crassigranosa* (Tate), Darragh, Mem.Nat.Mus.Victoria 31:164.

Shell up to 18.0 mm in length, solid, conically-ovate, teleoconch of 5¼-6 whorls, protoconch of 2½-3 small embryonic whorls, whorls concave on presutural ramp. Sculptured with slender axial ribs which number from 14-16 on penultimate or body whorl and spiral cords which number from 3-4 on the penultimate and from 7-8 on the body whorl; rounded, elevated nodules form at the point of intersection of axial and spiral cords, sutures with a row of nodules. Outer lip smooth or with up to 6 weak denticles, columella calloused, bordered and smooth, siphonal fasciole with up to 5 oblique cords. Some individuals with a broad varix on body whorl.

TYPE LOCALITY. Upper beds at Muddy Creek, Pliocene of Victoria, Australia.

STRATIGRAPHIC RANGE. Kalimnan, L.Pliocene, Victoria, Australia.



Figs. 42-44. *Nassarius(Niotha)crassigranosus* (Tate). 42. Lectotype Tate coll. SAM No. T-586; 14.0 mm. 43. Paralectotype Tate coll. SAM No. T-586; 17.4 mm. 44. Specimen from Muddy Creek, Hamilton, Victoria,Pliocene of Australia; 11.0 mm.

Type specimens. A growth-series of 18 specimens of *N.(N.) crassigranosus* ranging 4.0-17.4 mm, are in the Tate collection, SAM No. T-586. The syntype illustrated by Tate (1888,pl.12,fig.6a), dimensions 14.0 x 8.8 mm, is here selected as the lectotype (Fig. 42).

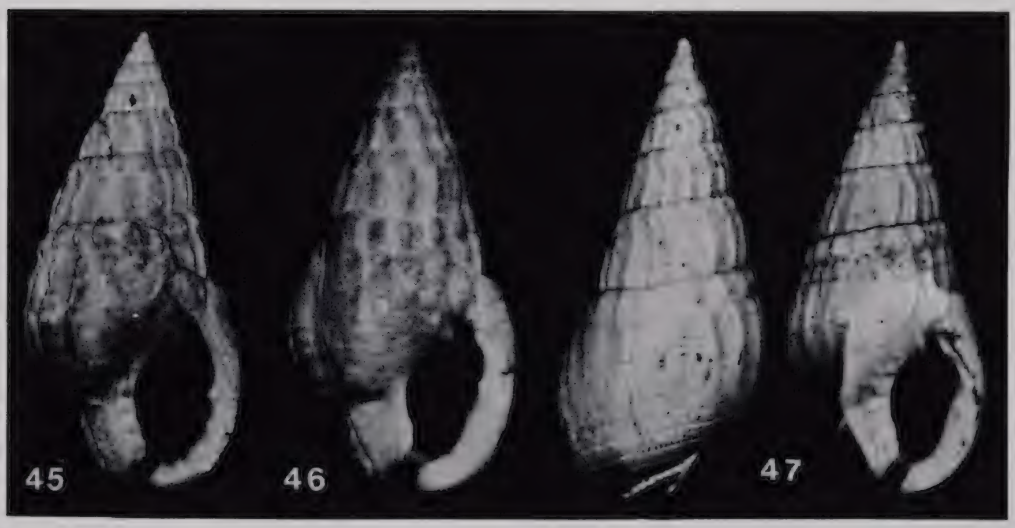
Material examined. Pliocene: Grange Burn near Hamilton, Victoria (AMS; NZGS); S.W. side of Bunga Creek, Upper Jemmy's Pt., E. of Lakes Entrance (AMS); Muddy Creek, Hamilton, Victoria (AMS; NZGS); Reported from the Sorrento Bore, Mornington Peninsula, Victoria, 585 feet (178 m) (Chapman 1928).

Nassarius (Niotha) nuttalli (Ludbrook, 1978) (Figs. 45-47)

1978. *Tavaniotha nigella nuttalli* Ludbrook, Geol.Surv.W.Austral.Bull. 125:152, pl.20,figs.33,34.

Shell up to 22.0 mm in length, elongate-ovate, spire tall, teleoconch of 6-6½ weakly convex to almost flat-sided whorls, protoconch of 2½-3 smooth embryonic whorls. Sculptured with slender axial ribs which number 15-16 on each of the last two whorls, ribs constricted anteriorly to suture by a narrow channel to form a row of sutural beads, axial ribs tending to become obsolete on lower half to the dorsal side of the body whorl; spiral sculpture consists of 5-6 weak cords or striae on lower half of body whorl. Outer lip variced and with 6-7 denticles within, columellar callus spreading on to body whorl without reaching suture, columella arcuate and with 4-8 strong denticles, parietal denticle distinct; siphonal notch prominent, fasciolar cord usually with a single cord.

TYPE LOCALITY. St.4434-FL8, 61 km E. of Madura, W.Eucla Basin, 31°53'47"S & 127°35'E, Roe Calcarenite, Early Pleistocene, S.W. Australia.



Figs. 45-47. *Nassarius(Niotha)nuttalli* (Ludbrook). 45. Holotype WAM No. 69.658; 20.1 mm. 46. Specimen from Roe Plains, Madura Dist., E.Pleistocene of W.Australia; 19.7 mm. 47. Specimen from bore at Jandakot, 420 m, E. Pleistocene of W.Australia; 19.2 mm and 21.2 mm respectively.

STRATIGRAPHIC RANGE. Early Pleistocene, S.W. Australia.

Type specimen. The holotype of *N.nuttalli* is in the WAM No. 69.658, dimensions 20.1 x 9.8 mm (Fig. 45).

Material examined. Early Pleistocene: Bore at Jandakot, 420 m, Perth Basin, S.W. Australia; Pit N. of Hampton Repeater Tower, Roe Plains, Madura district, S.W. Australia, carbonate sand (both WAM; AIM).

The general shape, formation of columellar callus and absence of spiral sculpture and nodules in *N.nuttalli* are far in excess of subspecific diagnostic differences, and I concur with G. W. Kendrick *(in litt.)* in assigning full specific status to *N.nuttalli*.

Nassarius (Niotha) sp. (Figs. 48,49)

This is a new species characterized by the thin, wide-spaced axial ribs which have a tendency to become obsolete, absence of spiral sculpture and thin, circular and spreading columellar callus.

The new species will be described in due course by Mr. G.W. Kendrick, Western Australian Museum, Perth. The specimens I have examined came from a Nu-Mix concrete bore and Paulik's Bore in the Jandakot area of the Perth Basin, Early Pleistocene of S.W. Australia (Figs. 48,49).

Figs. 48,49. *Nassarius(Niotha)* sp. 48. Nu-Mix concrete bore at Macglaglan Str., Jandakot, E.Pleistocene of W.Australia, WAM No.77.1015; 11.7 mm. 49. Paulik's bore, 41.9 - 42.1 m, Jandakot, E.Pleistocene of W.Australia; 8.0 mm.

Subgenus **Zeuxis** H. & A. Adams, 1853

Zeuxis H. & A. Adams, 1853, Gen.Rec.Moll. 1:119. Type species by SD (Cossmann, 1901) *Buccinum taenia* Gmelin, 1791 = *B.olivaceum* Bruguiere, 1789. Recent, Indo-Pacific.

1881. *Venassa* v.Martens, Conch.Mittheil. 2:109. Type species by M *Nassa (Venassa) pulvinaris* v.Martens, 1881 = malformed *Zeuxis* sp. Recent, Indonesia.
1969. *Glabrinassa* Shuto, Mem.Fac.Sci.Kyushu Univ.(D), Geol. 19(1):145. Type species by OD *G.amycliforma* Shuto, 1969 = *Nassa compta* A. Adams, 1852. Neogene of the Philippines.
1976. *Bathynassa* Ladd, Nautilus 90(4):131. Type species by OD *B.bolangoi* Ladd, 1976. Pleistocene, New Hebrides.

Species of the subgenus *Zeuxis* are separated from species of *Niotha* by the narrower, more clearly defined columellar callus and a columella which is denticulate along its entire length.

Three living and two fossil species are found in Australia but species of *Zeuxis* are absent from New Zealand.

Nassarius (Zeuxis) dorsatus (Roeding,1798) (Figs. 50-53)

1780. *"Buccinum laeve sinuatum"* Chemnitz, Neues syst.Conchyl.-Cab. 4:59, pl.125, figs.1194,1195 (non binom.).
1791. *Buccinum trifasciatum* Gmelin, Syst.Nat. ed.13:3489 (ref. to Gualtieri, pl.44,fig.A) (non Gmelin,1791, p.3477).
1798. *Buccinum dorsatum* Roeding, Mus.Bolten. p.111 (ref. to Chemnitz, op. cit., figs. 1194,1195).
1827. *Nassa livida* Gray in King, Narrat.Surv.Australia 2:App.p.484; 1917 Odhner, Kungl.Svenska Vet.Handl. 52:11,51.
1830. *Buccinum nitidulum* Cuvier, Le Regne Animal ed.2, 3:98, footnote (ref. to Chemnitz, op.cit., 4:1194,1195) [non Linnaeus,1758].
1834. *Buccinum unicolorum* Kiener, Spéc.gén.icon.coq.viv. 9:60,pl.19,fig.69.
1852. *Nassa laevis* Moerch, Cat.Conchyl.Yoldi 1:77 (ref. to Chemnitz, op.cit., figs.1194,1195); 1853 H. & A. Adams, Gen.Rec.Moll. 1:116.3: pl.12,figs. 7,7c. (non Fischer v.Waldheim,1807).
1853. *Nassa unicolorata* Reeve, Conch.Icon. 8:pl.3,fig.17.
1853. *Nassa rutilans* Reeve, *ibid.* 8:pl.22,fig.147; 1932 Tomlin, Proc.Malac. Soc.Lond. 20:97.
1877. *Nassa(Alectrion)rutilans* Reeve, Brazier, Proc.Linn.Soc.N.S.W. 1:180.
1879. *Nassa trifasciata* (Gmelin), Marrat, J.Conch. 2:78.
1880. *Nassa nitidula* Marrat, Prop.new forms gen.*Nassa* p.38.
1884. *Nassa unicolor* E.A.Smith, Rept.Zool.coll.H.M.S."Alert", p.49.
1906. *Bullia cinerea* Preston, Proc.Malac.Soc.Lond. 7:34,textfig.
1907. *Arcularia dorsata* Bolten, Hedley, Proc.Linn.Soc.N.S.W. 33:509; 1912 Verco, Trans. R.Soc.Sth.Australia 36:204; 1916 Hedley, J.R.Soc. W. Australia 1:61.
1955. *Nassarius dorsatus* Roeding, Cotton, R.Soc.Sth.Austral.Malac.Sect. No.7:2,fig.16.
1961. *Nassarius(Zeuxis)dorsatus* (Roeding), Rippingale & McMichael, Queensl. & Gt.Barrier reef shells p.105,pl.13,fig.24; 1972 Cernohorsky, Rec. Auckland Inst.Mus.9:168, figs.115,116 only.
1966. *Tarazeuxis unicolorus* (Kiener), Habe & Kosuge,Shells world col. 2:62,pl.22,fig.30.
1971. *Zeuxis dorsatus* (Roeding), Wilson & Gillett, Austral.Shells p.102, pl.66,figs.8,8a,b.

Shell up to 40.0 mm in length, solid and frequently polished, teleoconch of 7-8 weakly convex whorls, protoconch of 2-2½ smooth, small embryonic whorls; first 3-4 post-embryonic whorls with slender axial riblets and small sutural nodules, later whorls smooth, base of body whorl with 10-12 close-set oblique cords. Outer lip prominently

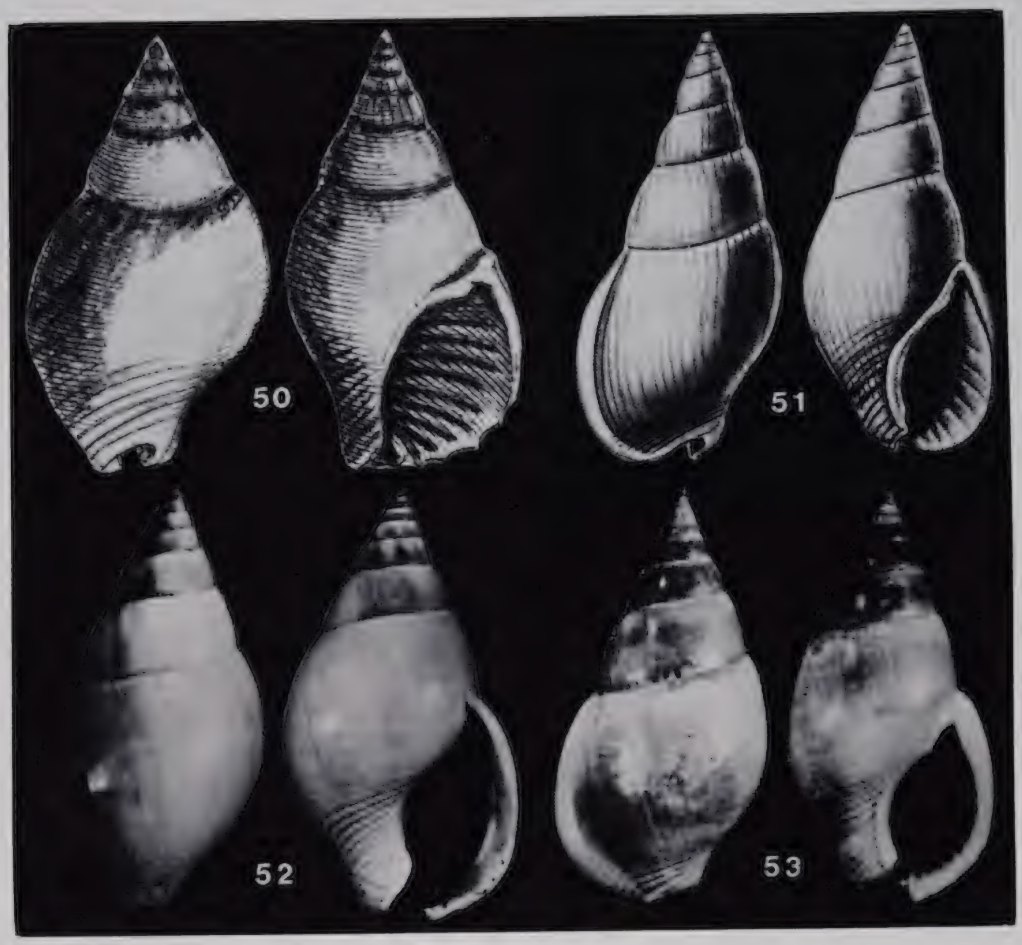
variced, interior edge with lirate denticles, base of outer lip with 4-6 sharp denticles, columellar callus narrow and defined and with a row of 10-14 small, regular denticles. Variable in colour, steel-blue, bluish-white to dark brown, some individuals with dilacerated transverse bands, columella and edge of outer lip white, interior of aperture purple-brown. Operculum yellowish-brown and usually with simple margins.

TYPE LOCALITY. None *(trifasciatum; dorsatum; nitidulum; unicolorum; laevis);* Australia *(livida);* Nth.Australia *(unicolorata);* New Zealand = error *(rutilans);* ? Ceylon = error *(cinerea).* Reeve (1853-54) was the first author to quote "North Australia" as the locality for the species, and Port Darwin, Northern Territory, Australia, is here designated as the type locality.

DISTRIBUTION. From Exmouth Gulf, Western Australia along the North Australian coast to the southern coast of West Irian and southward to Moreton Bay, Sth.Queensland. On reefs and mud-flats, 0-55 m. Verco's (1912) record of the species from Geraldton and specimens in the AMS labelled "Geographe Bay" require confirmation. Wilson & Gillett (1971) give Exmouth Gulf as the most southern West Australian occurrence and this is confirmed by the southernmost record from the Onslow area (Exmouth Gulf) seen in Museums.

Type specimens. Chemnitz's or Roeding's type-specimens of *N.dorsatus* can no longer be located, and I designate the specimen depicted by Chemnitz (1780) on plate 125, figs. 1194,1195, as the illustrated lectotype of *N.dorsatus* (Fig. 50). Three syntypes of *N.rutilans* are in the BMNH (no number), and the illustrated syntype, dimensions 26.2 x 13.0 mm, is here selected as the lectotype (Fig. 53). The immature holotype of *Bullia cinerea* is in the BMNH (no number), dimensions 29.5 x 15.7 mm (Fig. 52).

Material examined. Western Australia: Geographe Bay (AMS — requires confirmation); Onslow area; Beagle Bay; Pt.Samson near Port Hedland (all AMS); Port Hedland (NMV); Broome (AIM; AMS); Sunday I, King Sound near Derby (AMS); Yampi Sound (AIM); Port George; Augustus I (both NMV); Northern Territory: Port Darwin (AMS, AIM); Melvill I, off Darwin (AMS); Casuarina Beach, Darwin (NMV); Grose I, W.S.W. of Darwin; Berkeley Bay, E. side of Port Essington; Cayman's Creek, Port Essington; Elcho Pt. and Crocker I, Arnhem Land; Coburg Peninsula (all AMS); Queensland: Beach at Edward River mouth, W. coast Cape York Peninsula; Karumba, Gulf of Carpentaria; 7 km from Norman River, Karumba; Cape York Peninsula; N.E. Herald Cay, Coral Sea; Trinity Bay near Cairns (all AMS); Cooya Beach, N. of Port Douglas (coll.Gardner); Yorkey's Knob, 19 km N. of Cairns; Cairns (both AIM); Cardwell (NMV); Lucinda Pt.; (coll. Powell); Cockle Bay, Magnetic I (coll.Gardner); Point Marlowe near Townsville (AIM); Townsville (AMS); Gloucester I (AIM); Bowen; Slade Pt. (both NMV); Dingo Beach (AIM); Lindeman I, N. of Mackay (AMS); Newry I, N. of Mackay (USNM); Eimeo, N. of Mackay (AMS); Yeppoon (NZGS); Ross Creek, Yeppoon (coll.Gardner); Clontarf (NZGS); Calliope River estuary, Port Curtis; Port Curtis, off Gladstone (both AMS); Keppell Bay (coll.Powell); Shoal Bay Rocks, Keppell Bay; Mast Head I, Capricorn group; Somerset; (all AMS); Round Hill Heads (coll.Powell); Hervey Bay (USNM); Nudgee Beach, Moreton Bay; Scarborough, Moreton Bay (both AMS); Hammock Hills (NMV); S. W. Irian: Merauke (AMS).



Figs. 50-53. *Nassarius(Zeuxis)dorsatus* (Roeding). 50. Illustrated lectotype from Chemnitz (1780, pl.125,figs.1194,1195). 51. Type-figure of *Buccinum unicolorum* Kiener (from Kiener, 1834,pl.19,fig.69). 52. Immature holotype of *Bullia cinerea* Preston, BMNH (no No.); 29.5 mm. 53. Lectotype of *Nassa rutilans* Reeve, BMNH (no No.); 26.6 mm.

After re-examination of more extensive material of *N.dorsatus* the concept of the species has been revised. Although Chemnitz (1780) gave "Tranquebar" (India) as the locality and the species has occasionally been reported from Indian Ocean localities, it appears that *N. dorsatus* is endemic to the northern coast of Australia and southern coast of Papua New Guinea, according to material available at this time.

Nassarius (Zeuxis) pyrrhus (Menke, 1843) (Figs. 54-58)

1822. *Buccinum fasciatum* Lamarck, Hist.nat.anim.s.vert. 7:211; 1833 Quoy & Gaimard, Voy.L'Astrolabe 2:445,pl.32,figs.18-21 (non Mueller,1774).

1834. *Buccinum jacksonianum* Kiener, Spéc.gén.icon.coq.viv. 9:64,pl.19, fig.73 (non Quoy & Gaimard,1833).

1843. *Buccinum pyrrhum* Menke, Moll.Nov.Hollandiae p.21 (nom.subst.pro *B.fasciatum* Lamarck,1822).

1853. *Nassa(Tritia)dealbata* A.Adams, Proc.Zool.Soc.Lond. Pt.19:112.
1853. *Nassa fasciata* Lamarck, Reeve, Conch.Icon.8:pl.6,fig.40; 1898 Pritchard & Gatliff, Proc.R.Soc.Victoria 11:278.
1913. *Alectrion fasciata* Lamarck, Suter, Man.N.Z.Moll. p.397; 1915 Suter, *ibid.*, Atlas, pl.45,fig.16; 1927 Finlay, Trans.Proc.N.Z.Inst. 57:418 (excluded from N.Z. fauna).
1915. *Alectrion victorianus* Iredale, Trans.Proc.N.Z. Inst. 47:467 (nom. subst.pro *Buccinum fasciatum* Lamarck,1822).
1916. *Arcularia victoriana* Iredale, Hedley, J.R.Soc.W.Australia 1:61; 1925 Reath, J.R. Soc.W.Australia 11(6):39.
1921. *Nassarius victorianus* Iredale, May, Check-list Moll.Tasmania p.82; 1923 May, Illust.Ind.Tasman.shells p.81,pl.38,fig.18; 1932 Cotton & Godfrey, Sth.Austral.Nat. 13:98,pl.1,fig.6.
1936. *Nassarius pyrrhus* (Menke),Gabriel, Victorian Seashells p.12,textfig. 1974 Poore & Rainer, Austral.J.Mar.& Freshw.Res. 25:378; 1975 Cernohorsky, Rec.Auckland Inst.Mus.12:222,figs.28,29; 1980 Roberts & Wells,Rec.W.Austral.Mus. 8(3):346.
1938. *Niotha pyrrhus* (Menke), Cotton & Godfrey, Malac.Soc.Sth.Australia Publ.No.1:24; 1955 Cotton, R.Soc.Sth.Austral.Malac.Sect.No.7:2,fig.4; 1962 Macpherson & Gabriel, Mar.Moll.Victoria Handb. No.2:196,textfig. 233; 1966 Hodgkin et al. W.Austral.Nat.Club.Hanb. No.9:43; 1978 Ludbrook, Geol.Surv.W.Austral.Bull. 125:151.
1972. *Nassarius(Zeuxis)pyrrhus* (Menke), Cernohorsky, Rec.Auckland Inst. Mus. 9:171,fig.121 (shell), fig.142 (radula).

Shell up to 22.0 mm in length, teleoconch of 6-7 weakly convex whorls, protoconch of 2-2½ small, smooth embryonic whorls; sculptured with slender and angulate axial ribs which number 14-20 on last two whorls; ribs are crossed by coarse spiral cords which divide the ribs into nodules, sutural nodules separated from ribs by a shallow presutural groove. Columella calloused and irregularly denticulate along entire length, rows of denticles frequently doubled; denticles on outer lip confined to margin, interior of aperture smooth. White to pinkish-white in colour, ornamented with a dark rusty-brown band on the spire whorls and 2 bands on the body whorl; some specimens brown with yellowish-white spiral bands. Columella brown or mauve but white on parietal wall, aperture white, narrowly banded with brown, interior of siphonal canal flushed with violet in fresh specimens.

Rachidians of radula with 13-15 denticles, ovate accessory plate present, lateral teeth bicuspid.

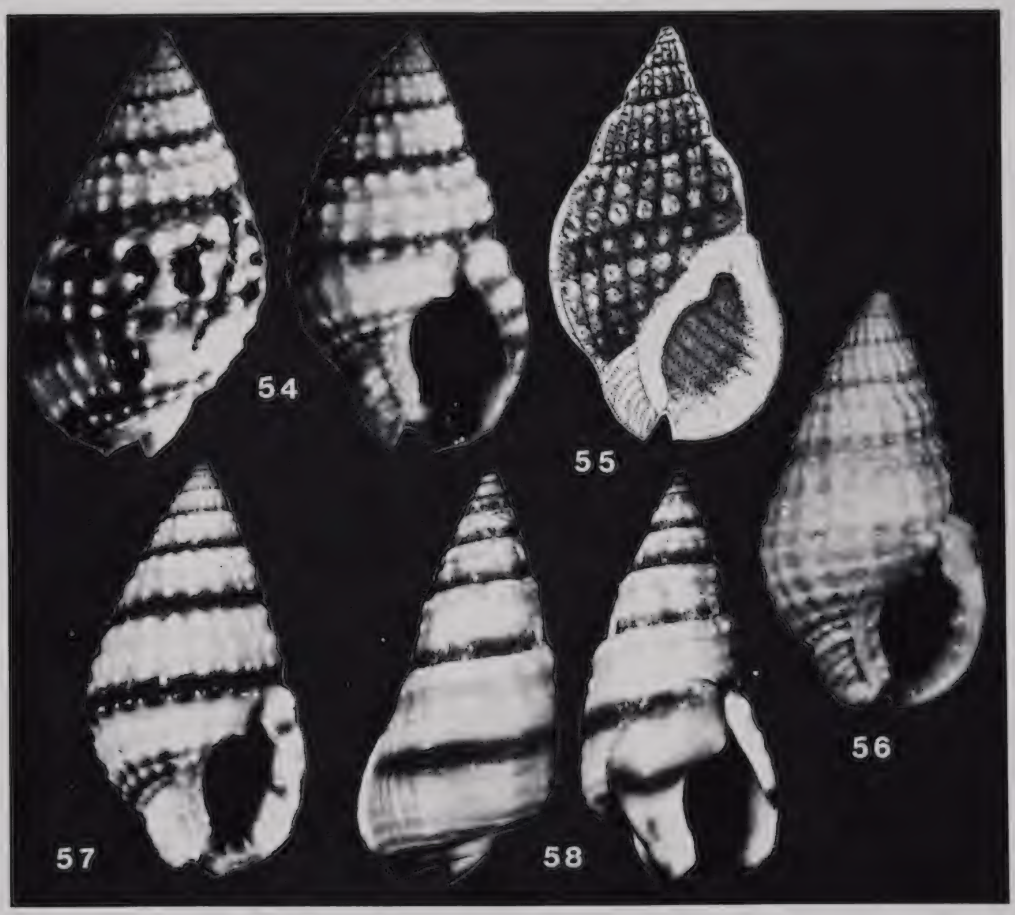
TYPE LOCALITY. New Holland = Australia *(fasciatum; pyrrhum; victorianus);* Damaguete, Negros I, Philippines = error *(dealbata).*

DISTRIBUTION. From Victoria to Tasmania and along the southern coast of Australia to Rottnest I, Western Australia. Marine and estuarine, on sand and mud flats, from 0-18 m. The two records of "Port Douglas, Queensland" and "Port Jackson, New South Wales" in the AMS are both suspect since it is doubtful that the species really lives in those regions. Suter's (1913-15) record of "Bay of Islands, New Zealand" is also erroneous.

Type specimens. The probable syntypes of *Buccinum fasciatum,* which are also the syntypes of *Nassarius pyrrhus* and *Alectrion victorianus,* are in the MHNG, No. 1296/7 and one of these questionable syntypes, dimensions 18.2 x 10.6 mm, is here illustrated (Fig. 54). According to Mermod (Dr Cl.Vaucher, *in litt.*), the extant specimens in the Lamarck collection could be type material since Lamarck owned 17 specimens ranging in size

18.0-20.0 mm, and several of the extant "syntypes" fall within this size-range. However, at this stage it is impossible to determine which of the specimens were actually Lamarck's types. The worn holotype of *N.dealbatus* is in the BMNH No. 197331, dimensions 14.0 x 7.4 mm (Fig. 56).

Material examined. Victoria: Point Welshpool (AMS); Wilson's Promontory (NMV); Western Port, 9-18 m (ZMC); Newhaven (NMV); Western Port (AMS); Cowes (coll. Powell); Phillip I (NMV); Point Leo (AMS); Sandringham (coll. Powell); Melbourne (NZGS); Port Phillip (AMS); Rosebud (NMV); Sorrento (AMS); Port Fairy (NZGS); Portland Bay (AMS); Tasmania: Fisher I, Bass Str. (NMV); Thunder & Lightning Bay, Barren I; Circular Head (both TMAG); W. side of Cape Portland (AMS); Stanley; Green's



Figs. 54-58. *Nassarius(Zeuxis)pyrrhus* (Menke). 54. Probable syntype of *Buccinum fasciatum* Lamarck, *B.pyrrhum* Menke and *Alectrion victorianus* Iredale, MHNG No. 1296/7/9; *c*. 18.2 mm (photo G.Dajoz, MHNG). 55. Typefigure of *Buccinum jacksonianum* Kiener (from Kiener, 1834,pl.19,fig.73). 56. Holotype of *Nassa dealbata* A.Adams, BMNH No. 197331; 14.0 mm. 57. Specimen from Semaphore, Sth.Australia; 19.5 mm. 58. Malformed specimen from Parsons's Bay, S.E.Tasmania, TMAG No. E-5317; 20.0 mm.

Beach; near mouth of Inglis River, Wynyard; Samphire I near Flinders I; Long Pt., Flinders I; Coles Bay; Oyster Bay, Maria I; Marion Bay; Bream Creek (all TMAG); Hobart (AMS); Pittwater (TMAG); Sandy Bay (AMS); Eaglehawk Neck; Rockeby; Pirate's Bay; Simmonds Bay in Barnes Bay; Bruni I (all TMAG); Bridport, S. of Bruni I (AMS); Bay of Islands, S. Bruni I; Cooks Beach; White Beach; W. Ulverstone (all TMAG); South Australia: Beachport (NZGS); Glenelg; Holdfast Bay (both AMS); Aldinga (NZGS); Port Milacowie (AMS); Adelaide (NZGS); Outer Harbour, Adelaide; Henley Beach; *c.* 3 km S. of Normanville, S. of Adelaide; Rocky Pt., Kangaroo I (all AMS); Pt.Collinson, Gaskoine Bay (NMV); Penneshaw, N. E. Kangaroo I (AMS); Larg's Bay, St.Vincent Gulf (AMS; NMV); Port Vincent (AMS); Port Augusta (AIM); Tickera, via Kadina (AMS); N. of Stansbury, Yorke's Peninsula (coll.Powell); Pondalowie Bay, Yorke's Peninsula; Tumby Bay; Port Lincoln; near Striking Creek, Port Lincoln; Pt.Brown, Smoky Bay; St.Peters I, S. of Ceduna (all AMS); Semaphore (TMAG); Western Australia: Israelite Bay (NMV); Middleton Beach, King George's Sound; Emu Pt.; (both AMS); Albany (AMS; NMV; NZGS); South Pt., E. of Albany; Flinders Bay near Cape Leeuwin; Mississippi Bay, 48 km E. of Esperance (all AMS); Geographe Bay (AMS; NMV); Garden I (NMV); Fremantle (AMS); Rottnest I (NMV; AMS); Peppermint Grove Beach (coll.Marrow); Perth (NMV); Irwin River; between Thursday I and Cowaramup Bay; Dunsborough (all AMS).

Fossil record: Pliocene: S.W. side of Bunga Creek, Princess Highway, Upper Jemmy's Pt., E. of Lakes Entrance, Victoria, Kalimnan (AMS); Pleistocene: Moine River mouth, Victoria (NZGS); Eyre highway, 104 km E. of Madura, W.Australia; salt-lake on shore, Rottnest I (both AMS).

The species is common on sand-flats from the mid-tide to low tide level. Malformed specimens also have been recorded, and the specimen from Parson's Bay, S.E. Tasmania (Fig. 58) has a drawn out appearance with altered whorls and a splayed out columellar callus and edentulous columella.

Nassarius (Zeuxis) subcopiosus (Ludbrook, 1958) (Figs. 59, 60)

1958. *Hinia(Reticunassa)subcopiosa* Ludbrook, Trans.R.Soc.Sth.Australia 81:64,pl.3,fig.1.
1970. *Reticunassa subcopiosa* (Ludbrook),Darragh, Mem.Nat.Mus.Victoria 31:197.
1978. *Nassarius(Reticunassa)subcopiosa* (Ludbrook), Geol.Surv.W.Austral.Bull.125:150, pl.17,figs.1,2.

Shell up to 9.0 mm in length, similar in shape to *N.pyrrhus*, teleoconch of 4¾-5 weakly convex whorls, protoconch of 3-3¼ smooth embryonic whorls. Sculptured with slender axial ribs which become thinner and more crowded towards the back of the outer lip, and number 16-17 on the penultimate and 17-19 on the body whorl. Spiral sculpture consists of spiral cords which override axial ribs and form small, low nodules at the point of intersection; spirals number 4 on the penultimate and 9-10 on the body whorl, siphonal fasciole with additional 5-6 crowded oblique cords. Outer lip weakly variced, interior with 8 lirate denticles, columellar callus narrow, well defined and with 6-7 denticles and a parietal denticle.

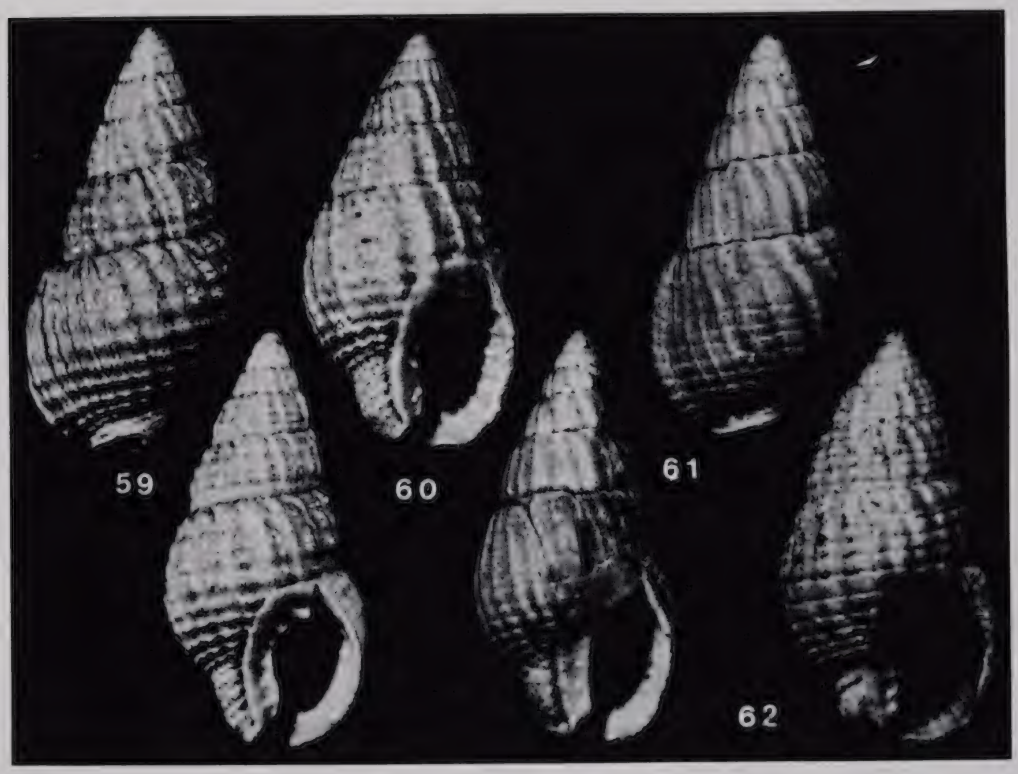
TYPE LOCALITY. Hindmarsh Bore, Dry Creek Sands, 137-148 m, L.Pliocene of Sth.Australia.

STRATIGRAPHIC RANGE. Pliocene -Pleistocene of southern Australia.

Type specimens. The holotype of *N.subcopiosus* is in the SAM No. F-15403, dimensions 8.4 x 4.0 mm (Fig. 59).

Material examined. L.Pliocene: Hindmarsh Bore, Dry Creek Sands, 137-148 m, Sth.Australia (AMS; NZGS); Pleistocene: Roe Calcarenite, Western Eucla Basin, W.Australia (Ludbrook, 1978).

The species is very similar to *N.pyrrhus* (Menke) and clearly belongs to the same genus-group rather than *Reticunassa* Iredale, 1936 (= *Hima* Leach in Gray, 1852). It differs from *N.pyrrhus* in the less numerous mature whorls and more numerous embryonic whorls, smaller size and stronger, thicker columellar callus above the parietal wall. *N.subcopiosus* is even closer to *N.spiraliscabrus* (Chapman & Gabriel, 1914) from the Victorian Pliocene, and differs only in the stronger, more nodulose spiral sculpture, a character which may be subject to variation.



Figs 59-62. 59,60. *Nassarius(Zeuxis)subcopiosus* (Ludbrook). 59. Holotype SAM No.F-15403; 8.4 mm. 60. Specimen from Hindmarsh bore, Dry Creek Sands, L.Pliocene of Sth.Australia; 8.1 mm. 61,62. *N.(Z.)spiraliscabrus* (Chapman & Gabriel). 61. Holotype NMV No.F-12491; 10.3 mm. 62. Specimen intermediate between *N.spiraliscabrus* and *N.subcopiosus* from Rondo's No.1 bore, Thornlie, Ascote beds, Pliocene of W.Australia; 7.3 mm.

Nassarius (Zeuxis) spiraliscabrus (Chapman & Gabriel, 1914) (Figs. 61,62)

1914. *Nassa spiraliscabra* Chapman & Gabriel, Proc.R.Soc.Victoria. N.S. 26(2):325, pl.28,fig.34.
1928. *Nassarius spiraliscabrus* (Chapman & Gabriel), Chapman, Rec.Geol.Surv. Victoria 5:164.
1958. *Hinia(Reticunassa)spiraliscabra* (Chapman & Gabriel), Ludbrook, Trans.R.Soc.Sth.Australia 81:65,pl.3,fig.2.
1970. *Reticunassa spiraliscarbra (sic)* (Chapman & Gabriel), Darragh, Mem.Nat.Mus.Victoria 31:195.

Shell up to 10.5 mm in length, elongate-ovate, teleoconch of 4½-5 weakly convex whorls, protoconch of 3-3¼ smooth embryonic whorls. Sculptured with irregular but mostly slender axial ribs which number from 19-22 on the penultimate and from 18-19 on the body whorl; spiral sculpture consists of weak or distinct spiral grooves which number from 2-5 on the penultimate and from 6-8 on the body whorl plus 4 spiral cords, siphonal fasciole with 5-7 oblique cords. Outer lip variced, interior with 9-10 lirate denticles, columellar callus well defined and with 4-7 denticles apart from parietal denticle, siphonal notch distinct.

TYPE LOCALITY. Mallee Bore No.8, 199-209 feet (61-64m), Pliocene of Victoria.

STRATIGRAPHIC RANGE. Lower Pliocene (Kalimnan) of Victoria, Sth.Australia and Western Australia.

Type specimens. The holotype of *N.(Z.) spiraliscabrus* is in the NMV No. P-12491, dimensions 10.3 x 5.2 mm (Fig. 61).

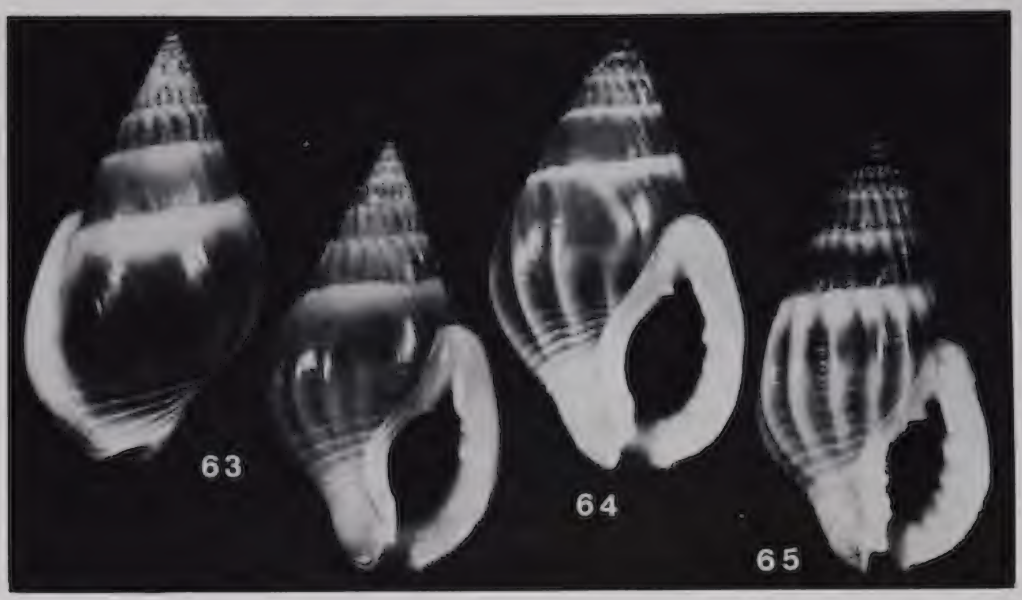
Material examined. Pliocene: Rando's No.1 Bore, 11 Spring Road, Thornlie, Ascot beds, Western Australia (WAM). Reported from the Sorrento Bore at 302 m, Mornington Peninsula, Victoria (Chapman 1928) and Weymouth and Abbatoir's Bore, Sth.Australia (Ludbrook 1958).

The species is similar to *N.subcopiosus* (Ludbrook), but differs in the more subdued and occasionally almost obsolete spiral sculpture. A specimen from the Ascot beds of Western Australia has more prominent spiral grooves which give an indication of nodules upon the axial ribs (Fig. 62).

Nassarius (Zeuxis) fraudator Cernohorsky, 1980 (Figs. 63-65)

1980. *Nassarius(Zeuxis)fraudator* Cernohorsky, Rec.Auckland Inst.Mus. 17:141, figs.12-15 (shell), fig.16 (radula), fig.17 (operculum).

Shell up to 18.0 mm in length, elongate-ovate and solid, teleoconch of 6-7 flat-sided whorls, protoconch incomplete in adults and very worn in juveniles. Early spire whorls sculptured with strong, angulate axial ribs which are weakly indented at sutures to form a row of not very prominent satural nodules, last 2 whorls extremely variable in sculpture, penultimate whorl either smooth or with up to 15 axial ribs, ventral side of body whorl with 4-7 strong, sinuous axial ribs, dorsal, side without ribs; sutures of last two whorls with a low, ill-defined sutural girdle, varix of outer lip very strong and with short spiral threads in the depression of the varix. Spiral sculpture usually absent but occasionally fine spiral striae may be present, base of shell with 4-5 cords, siphonal fasciole with 5-8 cords. Interior of aperture with 6-8 angulate lirae, columella distinctly calloused and with 4-9 round nodules and a parietal denticle. Variable in colour, usually dark brown, tan or grey,



Figs 63-65. *Nassarius(Zeuxis)fraudator* Cernohorsky. 63. Holotype AMS No. C-114468; 17.5 mm. 64. Paratype from Hall Sound, Papua New Guinea, AMS No. C-54863; 16.0 mm. 65. Paratype from Darwin, Northern Territory; 12.9 mm.

sutures and varix white to cream, occasional specimens off-white with only broad brown bands on last 2 whorls, aperture white but brown deep in interior. Operculum yellowish-brown, margins simple or very obsoletely serrate.

Rachidians of radula with 11 slender denticles, central denticle larger, accessory lateral plate absent, lateral teeth simple and bicuspid.

TYPE LOCALITY. Somerset Bay, Cape York Peninsula, Nth.Queensland, Australia.

DISTRIBUTION. From Exmouth Gulf, Western Australia to the southern coast of Papua New Guinea and Cape York, Queensland. On sand-flats, intertidal.

Type specimens. The holotype of *N.(Z.) fraudator* is in the AMS No.C-114468, dimensions 17.5 x 9.3 mm (Fig. 63).

Material examined. Queensland: Saibai village, Saibai I, Torres Str.; Mud Bay, Cape York; Somerset Bay, Cape York; near Bamaga, N.W. Cape York Peninsula (all AMS); Northern Territory: Darwin; Rose River Mission, Arnhem Land, Gulf of Carpentaria (both AMS); Western Australia: S.E. of Exmouth homestead, S. of Learmouth, Exmouth Gulf (AMS);Broome (AIM; coll.Powell); Barred Creek, N. of Broome (AIM;NMV;coll. Whitehead); Willy Willy Creek (NMV). Papua New Guinea: Hall Sound, N.W. of Port Moresby (AMS).

The species has been known since last century but has usually been confused with either *N.monile* (Kiener) (= *N.distortus* A.Adams), or the Indo-Malayan *N.jacksonianus* (Quoy & Gaimard).

Subgenus **Gussonea** Monterosato, 1912

Gussonea Monterosato,1912, J. Conchyl. 59(4):295. Type species by M *Buccinum tinei* Maravigna,1840. Recent, Mediterranean.

1853. *Amycla* H. & A.Adams, Gen.Rec.Moll. 1:186. Type species by SD (Bucquoy, Dautzenberg & Dollfus, 1882) *Buccinum corniculum* Olivi, 1792. Recent, Mediterranean (non *Amycla* Rafinesque, 1815; nec Doubleday, 1849).

1918. *Amyclina* Iredale,Proc.Malac.Soc.Lond. 13:28,31. Type species (Art. 67(i) of ICZN) *Buccinum corniculum* Olivi, 1792 (nom.subst.pro *Amycla* H. & A. Adams, 1853).

1972. *Fackia* Nordsieck, Mioz.Moll.Miste-Winterswijk p.78. Type species by OD *Nassa facki* Koenen, 1872. Miocene of Europe.

Nassarius (Gussonea) wilsoni (Ludbrook) is the only Australian species tentatively assigned to the subgenus *Gussonea*. Both *Gussonea* and *Telasco* H. & A. Adams, 1853 (type-species *Buccinum cuvierii* Payraudeau, 1826, from the Mediterranean) are closely similar except that in *N.corniculum* the animal lacks metapodial tentacles and in species of *Telasco* the axial ribs continue almost to the penultimate whorl whereas the spire whorls are smooth in *Gussonea*. The chronological priority of *Gussonea* over *Amyclina* has been discussed by Cernohorsky (1977).

Nassarius (Gussonea) wilsoni (Ludbrook, 1978) [nom.praeocc.] (Figs. 66,67)

1978. *Amyclina wilsoni* Ludbrook, Geol.Surv.W.Austral.Bull 125:150,pl.17, figs 3,4 (non *Nassa wilsoni* C.B. Adams, 1852 = *Nassarius*).

Shell up to 14.0 mm in length, elongate-ovate, teleoconch of 5 convex whorls, protoconch of 1¾-2 smooth, slightly globose embryonic whorls. Smooth except for up to 12 thin axial ribs on the dorsal side of the outer lip and 7-8 spiral cords on the lower third of the body whorl and an additional 5-6 oblique cords on the siphonal fasciole; sutures impressed or narrowly canaliculate, imperceptibly crenulate and bordered by a fine sutural groove, well preserved specimens with numerous, slightly arcuate longitudinal macrostriae on last two whorls. Outer lip varied, interior of aperture with 7-8 weak denticles, columellar callus narrow but well defined, columella with 7-8 weak denticles which sometimes extend along entire margin, parietal denticle distinct.

Figs. 66,67. *Nassarius (Gussonea) wilsoni* (Ludbrook) (nom.praeocc.). 66. Holotype WAM No. 70.29b; 12.9 mm. 67. Roe Plains, Madura Dist., E.Pleistocene of W.Australia. WAM: 13.3 mm.

TYPE LOCALITY. St.4434-FL6, Hampton Microwave Repeater Tower, 31°57'57''S & 127°34'45''E, Roe Calcarenite, Eucla Basin, E.Pleistocene of S.W.Australia.

STRATIGRAPHIC RANGE. Only recorded from Early Pleistocene deposits of the Eucla Basin, S.W. Australia, Pleistocene.

Type specimens. The holotype of *N.(G.) wilsoni* is in the WAM No.70.29b, dimensions 12.9 x 7.0 mm (Fig. 66).

Material examined. Early Pleistocene: 51 km E. of Madura; *c*. 3.2 km S. of Hampton radio station, off Nullabor Plain Road, S.W. Australia (both AMS); Pit 1.5 km N. of Hampton Microwave repeater tower, Roe Plains, Madura district, S.W. Australia, carbonate sand (WAM; AIM).

Amyclina wilsoni Ludbrook, 1978, is a secondary homonym of the living *Nassa wilsoni* C.B. Adams, 1852, from the Pacific side of Panama and Central America. Both clearly belong to the genus *Nassarius* and a substitute name will have to be proposed for the homonymous *wilsoni* Ludbrook.

Subgenus **Hima** Leach in Gray, 1852

Hima Leach in Gray, 1852, Moll.Brittan.Synop. p.122. Type species by SD (Marwick,1931) *Buccinum minutum* Pennant, 1777 = *B.incrassatum* Stroem, 1768. Recent, Mediterranean.
1852. *Tritonella* A.Adams, Proc. Zool.Soc.Lond. Pt.19:111 (non Swainson, 1839).
1931. *Mirua* Marwick, N.Z.Geol.Surv.Palaeont.Bull. No.13:115. Type species by OD *Nassa socialis* Hutton, 1886 = *Nassarius tatei socialis* (Hutton). Miocene of New Zealand.
1936. *Reticunassa* Iredale, Rec.Austral.Mus. 19:322. Type species by OD *Nassa paupera* Gould, 1850. Recent, Indo-Pacific.

The homonymy and type designations of this group have been discussed in detail by Cernohorsky (1972). One Recent and 1 fossil species are recorded from Australia and 1 fossil subspecies from New Zealand.

Nassarius (Hima) tatei tatei (Tenison-Woods,1879) (Figs. 68-70)

1879. *Nassa tatei* Tenison-Woods, Proc.Linn.Soc.N.S.W. 3:230,pl.21,fig.13; 1880 Tenison-Woods, Proc.Linn.Soc.N.S.W. 4:20,pl.2,fig.2; 1887 Hutton, Proc.Linn.Soc.N.S.W. (2) 1:481; 1888 Tate, Trans.Proc.R.Soc.Sth.Australia 10:170,pl.12,fig.9; 1897 Harris, Cat.Tert.Moll.Brit.Mus.Pt.1:169.
1928. *Nassarius tatei* T.W., Chapman, Rec.Geol.Surv. Victoria 5(1):164.
1970. *Reticunassa tatei* (Tenison-Woods), Darragh, Mem.Nat.Mus.Victoria 31:200.

Shell up to 9.00 mm in length, ovate to elongate-ovate, teleoconch of 3-4¾ convex whorls, protoconch of 3¼-3¾ smooth and somewhat swollen embryonic whorls, sutures impressed. Sculptured with slender axial ribs which number 13-19 on the penultimate and 10-20 on body whorl; spiral sculpture consists of moderately crisp spiral threads which cross over ribs and occasionally produce small, low nodules on the summits; spiral threads number 4-8 on penultimate and 13-19 on body whorl. Outer lip varied and with 8-13 small denticles, columellar callus moderately narrow and well defined, columella with a basal denticle and occasionally an adjoining small denticle, remainder smooth, parietal denticle usually present, siphonal fasciole with 5-8 oblique cords.

TYPE LOCALITY. Lower beds at Muddy Creek, Victoria, Middle Miocene.

STRATIGRAPHIC RANGE. Lower Miocene — Upper Pliocene, Sth.Australia to Western Australia.

Type specimens. Forty-three syntypes of *N.tatei* are in the AMS No.F-1771, and the illustrated syntype, dimensions 7.3 x 3.6 mm, is here selected as the lectotype (Fig. 68).

Material examined. Miocene: Nullarbor Plain and 51 km E. of Madura, Western Australia (AMS); River Murray cliffs near Morgan, Victoria; Fyansford, Victoria; Schnapper Pt., Port Phillip, Victoria; Gellibrand, Victoria (all Tate coll., SAM); S.E. end of Gibson Beach, S.E. of Port Campbell, Gellibrand marl, Victoria; Altona, Newport form., Victoria; Fossil Beach, Balcombe Bay, Mornington, Victoria; Mt.Eliza Beach cliff face, Victoria; Schnapper Pt., Hobson's Bay, Victoria; Mornington, Victoria; Grice's Creek, Port Phillip, Victoria; Murray River, Muddy Creek, Hamilton, Victoria; Clifton Bank, Hamilton, Victoria (all AMS). Pliocene: Grange Burn Coquina near Hamilton, Victoria (AMS); Hallet's Cove sandstone, St.Australia (Tate coll., SAM).

Harris (1897) commented on the species exceeding variability in shape and sculpture, as an examination of a large series left him in no doubt that all the diverse forms belonged to one and the same species. A similar high degree of variability can be observed in the closely related Indo-Pacific species *N.(H.) pauperus* (Gould).

Nassarius (Hima) tatei socialis (Hutton,1886) (Figs. 71-75)

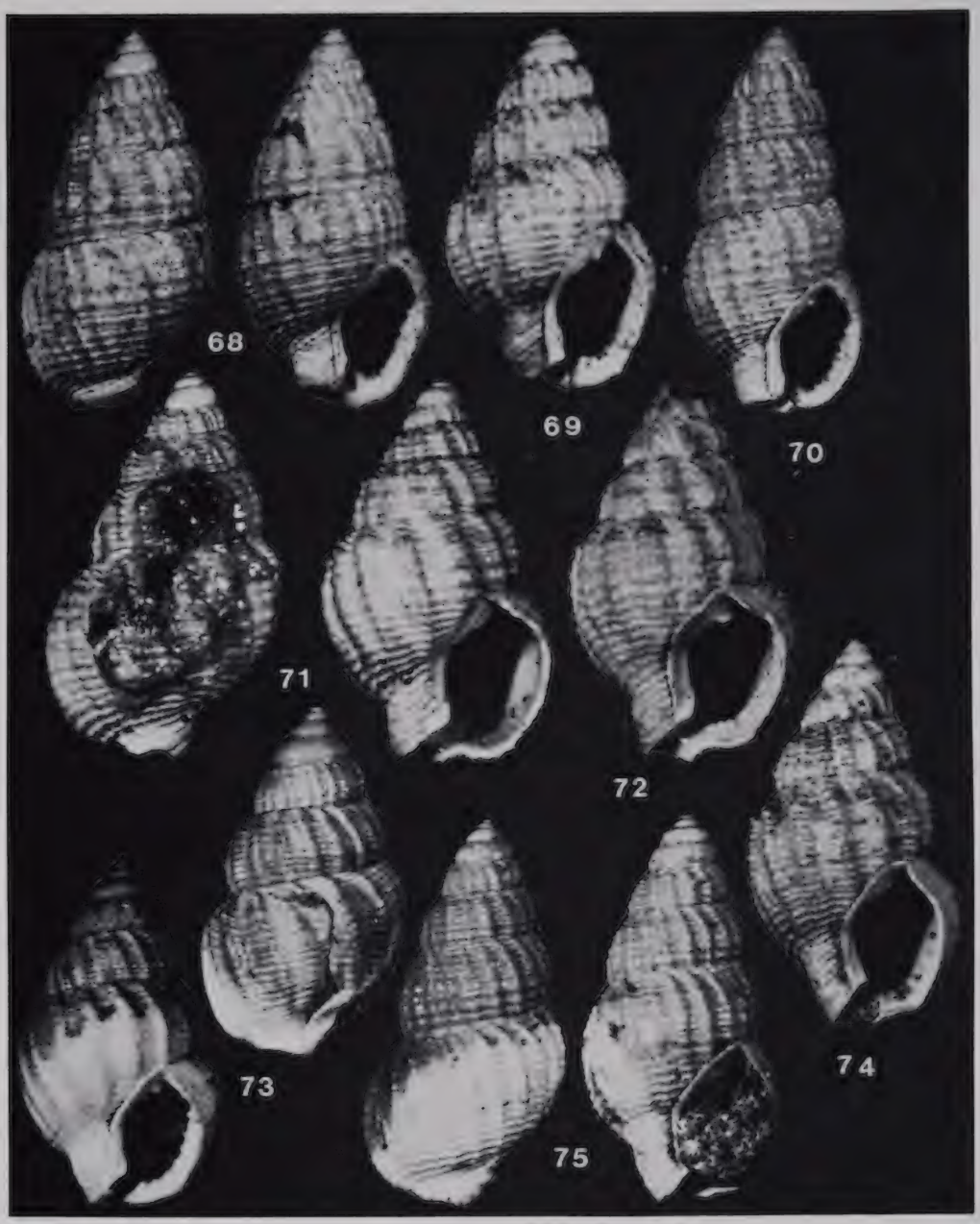
1877. *Nassa(Uzita)compta* Hutton,Trans.Proc.N.Z.Inst. 9:596,pl.16,fig.9 (non A.Adams, 1852).
1886. *Nassa socialis* Hutton, Trans.Proc.N.Z.Inst. 18:333; 1887 Hutton, Proc.Linn.Soc.N.S.W. (2), 1:210 (nom.subst.pro *N.compta* Hutton,1877).
1915. *Alectrion socialis* (Hutton), Suter, N.Z.Palaeont.Bull. 3:27.
1931. *Hima(Mirua)socialis* (Hutton), Marwick,N.Z.Palaeont.Bull. No.13:115, pl.12,fig.227; 1966 Fleming, D.S.I.R. Bull.No.173,pl.110,fig.1348.
1938. *Hima(Mirua)* aff. *socialis* (Hutton), Powell, Trans.Proc.R.Soc.N.Z. 68:375.
1939. *Hima(Mirua)separabilis* Laws,Trans.Proc.R.Soc.N.Z. 68:496,pl.65,fig.52; 1966 Fleming, D.S.I.R. Bull. No.173:63.

The subspecies is almost inseparable from the Australian Miocene *N.tatei tatei* and displays the same high degree of variability in shape and number and prominence of axial ribs and spiral cords. Some New Zealand individuals have a subangulate body whorl which is on rare occasions minutely echinate and constricted at the sutures, features not observed in Australian populations of *N.tatei*.

TYPE LOCALITY. White Rock River, Canterbury (Awamoan), Lower Miocene of New Zealand *(socialis);* Pakaurangi Pt., Kaipara Harbour, (Otaian), L.Miocene of New Zealand *(separabilis)*.

STRATIGRAPHIC RANGE. Otaian, L.Miocene — Tongaporutuan, U.Miocene of New Zealand.

Type specimens. Three syntypes of *N.(H.)tatei socialis* are in the OMD No. C.5434, and the illustrated syntype, dimensions 7.4 x 4.2 mm, is here selected as the lectotype (Fig. 71). The holotype of *N.separabilis* is in the NZGS No.TM-1282, dimensions 5.5 x 3.4 mm (Fig. 73).



Figs. 68-75. 68-70. *Nassarius(Hima)tatei tatei* (Tenison-Woods). 68. Lectotype AMS No. F-1771; 7.3 mm. 69. Paralectotype; 6.8 mm. 70. Slender specimen from Fossil Beach, Balcombe Bay, Mornington, Victoria, Miocene of Australia, AMS No. C-100704; 8.5 mm. 71-75. *N.(H.) tatei socialis* (Hutton). 71. Lectotype OMD No. C-5434; 7.4 mm. 72. Paralectotype OMD No. C-5434; 6.6+ mm. 73. Holotype of *Nassa separabilis* Laws, NZGS No. TM-1282; 5.5 mm. 74. Paratype of *N.separabilis* Laws; 6.8 mm. 75. Slender paratype of *N.separabilis* Laws; 6.9 mm.

Material examined. Miocene: Pakaurangi Pt., Kaipara Harbour; Bluecliffs, Sth.Canterbury; Holme Station, Pareora (all AIM); Pareora, S. of Timaru (AMS); Dyer's Run, Waihao; White Rock River, Canterbury; Sutherlands, Sth. Canterbury; Mt.Harris, Canterbury; Opihi River, Sth.Canterbury; Ashburton River, Canterbury; Target Gully, Oamaru, Otago; Rifle Butts, Oamaru; Pukeuri, Oamaru; Ardgowan shell-pit, Oamaru; Awamoa Creek, Otago; Loc. 5 and 6, Awakino; Clifden, Southland, E.side of A and C, bands 6B, 6C and 8A; Muddy Creek, Gisborne, 61 m above sandstone (all AIM).

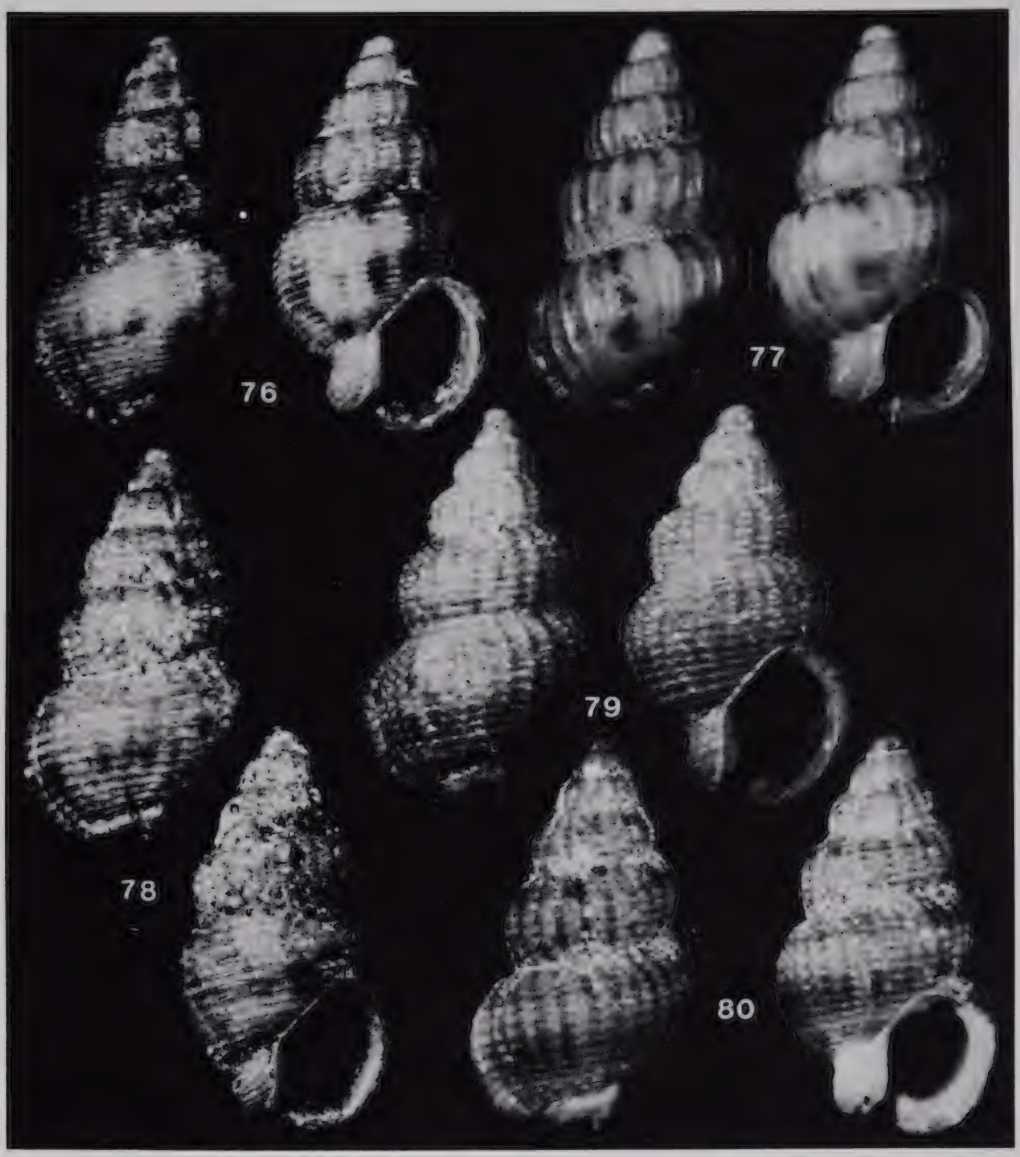
Having examined over 800 specimens, it became apparent that some diagnostic characters used to separate *N.separabilis* from *N.socialis*, e.g. more numerous axial ribs and spiral striae in *N.separabilis*, were distributed at random in populations from various localities and subject to considerable variation. At Pakaurangi Pt., both forms are represented, the form at Bluecliffs resembles *N.separabilis* but is broader and more solid and the same form also occurs at the younger Clifden beds, bands 6B and 8A, while specimens at Clifden 6C are coarsely sculptured and have a minutely echinate presutural ramp and constricted sutures. At Dyer's Run the *socialis* and Bluecliff forms are represented, at White Rock River only typical *socialis* were seen, some specimens from Bluecliffs had the appearance of the *separabilis* form and at Target Gully a mixture of all forms could be found. One of the paratypes of *N.separabilis* is the elongate form of the species (Fig. 75) and closely resembles specimens of *N.tatei* in the Tenison-Woods and Tate collections, while another paratype of *N.separabilis* is the *socialis* form of the species.

N.(H.) tatei socialis (Hutton) is retained as a weak subspecies. Hutton (1887) himself synonymized his *socialis* with the earlier *tatei* Tenison-Woods.

Nassarius (Hima) mobilis (Hedley & May,1908) (Figs. 76-80)

1908. *Arcularia mobilis* Hedley & May, Rec.Austral.Mus. 7:121,pl.23,fig.16.
1908. *Arcularia mobilis* var. *costata* Hedley & May, Rec.Austral.Mus. 7:121, pl.23,fig.17 (non S.V.Wood,1848; nec A.Adams,1852).
1921. *Nassarius mobilis* Hedley & May, May, Check-list Moll.Tasmania p.82; 1923 May, Illust.Ind.Tasman.shells p.81,pl.38,fig.13.
1932. *Nassarius verconis* Cotton & Godfrey, Sth.Austral.Nat. 13:94,pl.1,fig.7.
1936. *Reticunassa mobilis plankta* Iredale, Rec.Austral.Mus. 19:322; 1962 Iredale & McMichael, Austral.Mus.Mem. No.11:67.
1938. *Reticunassa verconis* Cotton & Godfrey, Cotton, Malac.Soc.Sth.Austral. Publ. No.1:24; 1955 Cotton, R.Soc.Sth.Austral.Malac.Sect. No.7:2,fig.9.
1962. *Reticunassa compacta benthalis* Gabriel, Mem.Nat.Mus.Victoria No.25:189, textfig. 1; 1962 Macpherson & Gabriel, Nat.Mus.Victoria Handb. No.2:195.

Shell up to 8.0 mm in length, elongate-ovate, moderately thin, teleoconch of 3¾-4¼ convex, inflated whorls which occasionally become roundly subangulate on presutural ramp, protoconch of 1¾-2 smooth, globose embryonic whorls. Sculptured with thin axial ribs which number 14-21 on penultimate and 12-23 on body whorl, axial ribs frequently becoming obsolete on last two whorls; spiral sculpture consisting of crisp, overriding spiral threads which number 8-10 on penultimate and 15-18 on body whorl, spiral threads occasionally obsolete, interspaces between spirals macroscopically axially striate. Outer lip variced and convex, interior with 6-13 minute or obsolete denticles, columella narrowly calloused, base with 1-2 small denticles, parietal denticle weak and blunt, fasciole twisted to left and with 7-10 crowded cords. White to cream in colour, spire whorls with 2 and body whorl with 3 ♂lacerated orange-brown to reddish-brown bands sometimes only visible as wide-spaced spots.



Figs. 76-80. *Nassarius(Hima)mobilis* (Hedley & May). 76. Holotype AMS No. C-28972; 7.2 mm. 77. Holotype of *Arcularia mobilis* var. *costata* Hedley & May, AMS No. C-28973; 6.8 mm (smooth form). 78. Holotype of *Recticunassa mobilis plankta* Iredale, AMS No. C-60714; 7.5 mm. 79. Holotype of *Nassarius Verconis* Cotton & Godfrey, SAM No. D-10186; 7.1 mm. 80. Holotype of *Reticunassa compacta benthalis* Gabriel, NMV No. F-20838; 7.5 mm.

TYPE LOCALITY. 7 miles (11 km) E. of Cape Pillar, Tasmania, Australia, 100 fathoms (183 m) [*mobilis* and *costata*]; Beachport, Sth.Australia, 150 fathoms (275 m) [*verconis*]; off Newcastle Heads, New South Wales, 40 fathoms (73 m) [*plankta*]; off Cape Everard, Sth.Australia, 65 fathoms (119 m) [*benthalis*].

DISTRIBUTION. From Crowdy Head, New South Wales to Victoria, Tasmania and South Australia. Subtidal, 37-667 m.

Type specimens. The holotype of *N.(H.) mobilis* is in the AMS No.C-28972, dimensions 7.2 x 4.1 mm (Fig. 76) together with the holotype of the smooth form *costata* No. C-28973, dimensions 6.8 x 3.7 mm (Fig. 77). The holotype of *N.verconis* is in the SAM No. D-10186, dimensions 7.1 x 4.0 mm (Fig. 79), the holotype of *N.mobilis plankta* is in the AMS No. C-60714, dimensions 7.5 x 3.9 mm (Fig. 78), and the holotype of *N.compacta benthalis* is in the NMV No. F-20838, dimensions 7.5 x 4.3 mm (Fig. 80).

Material examined. New South Wales: 18 km W. of Crowdy Heads, 91 m; off Newcastle Heads, 73 m; 32 km S.E. of Twofold Bay, 37°26'S & 150°15'E, 149 m (all AMS); Victoria: off Gabo I, 55-146 m; 40 km S. of Cape Everard, 38°15'S & 149°12'E, 315 m; between Cape Howe and Lakes Entrance, 38°13'S & 149°06'E, 146-158 m; S. of Mt.Cann, 101-183 m (all AMS); off Lakes Entrance, 37 m (NMV); Tasmania: 32 km E. of Babel I, Furneaux group, Bass Str., 120 m; N. of Great Oyster Bay, 41°46'S & 148°31'E, 113 m; off Cape Forrestier, 42°10'S & 148°34'E, 205 m; 40 km N.E. of Beaching Bay, Maria I, 42°27'S & 148°17'E, 82 m (all AMS); Thouin Bay, 73 m (TMAG); Cape Pillar, 183 m; N.E. of Cape Pillar, 92-110 m; W. of Port Dorey, 43°22'S & 145°44'E, 144 m; S.E. of S.W. Cape, 43°38'S & 146°08'E, 119 m (all AMS); South Australia: Beachport, 275 m (SAM); off Cape Martin, Beachport, 667 m; off Cape Jaffa, 237 m; between Cape Jaffa & Kangaroo I, 75-155 m (all AMS).

Subgenus **Cryptonassarius** Cernohorsky, 1975

Cryptonassarius Cernohorsky, 1975, Rec.Auckland Inst.Mus. 12:218. Type species by OD *Nassa ephamilla* Watson,1882. Recent, Australia and New Zealand.

Nassarius ephamillus has usually been placed in the subgenus *Hima*, but it lacks the typically fusiform, solid shape, thick varied outer lip, short denticled aperture, parietal fold and distinct siphonal canal of *Hima* species.

Cryptonassarius is monotypic at the present time, containing the deep-water Austral-Neozelanic *N.ephamillus* (Watson).

Nassarius (Cryptonassarius) ephamillus (Watson,1882) (Figs. 81-83)

1882. *Nassa ephamilla* Watson, J.Linn.Soc.Lond. 16:370; 1883 Watson, N.Z. J. Science 1:442; 1884 Hutton, Trans.Proc.N.Z.Inst. 16:233.

1886. *Nassa(Tritia)ephamilla* Watson, Rept.Sci.Res.Voy.H.M.S. "Challenger", Zool. 15:187,pl.11,figs.9a-d.

1886. *Nassa dissimilis* Watson, Rept.Sci.Res.Voy.H.M.S."Challenger",Zool. 15:175,pl.17,fig.6.

1906. *Nassa jacksonensis* "Quoy & Gaimard", Hedley, Rec.Austral.Mus. 6(3): 214 (non *Buccinum jacksonianum* Quoy & Gaimard,1833 = *Nassarius*).

1907. *Arcularia dipsacoides* Hedley, Rec.Aust.Mus. 6(5):359,pl.67,fig.21; 1907 Verco, Trans. R.Soc.Sth.Australia 31:214,pl.29,fig.13 (radula).
1913. *Alectrion ephamilla* Watson, Suter, Man.N.Z.Moll. p.396; 1915 Suter, *ibid.*, Atlas, pl.191,fig.2.
1913. *Alectrion dissimilis* Watson, Suter, Man.N.Z.Moll. p.396; 1915 Suter, *ibid.*, Atlas, pl.19,fig.1.
1918. *Nassarius dipsacoides* Hedley, J.Proc.R.Soc.N.S.W. 51:M88; 1932 Cotton & Godfrey, Sth.Austral.Nat. 13(3):94.
1938. *Reticunassa flindersi* Cotton & Godfrey, Rec.Austral.Mus. 6(2):204, pl.17,fig.8; 1938 Cotton & Godfrey, Malac.Soc.Sth.Austral.Publ.No.1: 24; 1955 Cotton, R.Soc.Sth.Austral.Malac.Sect. No.7:2,fig.10.
1951. *Nassarius ephamillus* (Watson), Fleming, Trans.Proc.R.Soc.N.Z. 79(1): 137; 1956 Dell, Dominion Mus.Bull. No.18:109,pl.13,figs.127,128; 1968 Ponder, Rec.Dominion Mus. 6(4):31,pl.1,fig.15 (radula),fig.16 (operculum).
1962. *Nassarius dissimilis* (Watson),Clarke,Nat.Mus.Canada Bull. No.181:26.
1962. *Reticunassa dipsacoides* (Hedley),Iredale & McMichael, Austral.Mus. Mem. No.11:67.
1975. *Nassarius(Cryptonassarius)ephamillus* (Watson),Cernohorsky, Rec. Auckland Inst.Mus. 12:219,figs.13-22.

Shell up to 19.0 mm in length but frequently smaller, elongate-ovate, teleoconch of 3-4½ weakly or distinctly angulate whorls, protoconch of 3¼-4 smooth, rounded embryonic whorls; sculptured with axial ribs and overriding spiral threads which produce a granulose sculpture, penultimate whorl with 15-26 axial ribs and 3-5 spiral cords, body whorl with 17-30 ribs and 8-12 cords. Outer lip moderately thin, convex, varix lacking, aperture edentulous, columella concave and calloused in very mature specimens but callus small, narrow and not spreading, distal end of columella with a thin, elevated ridge, siphonal canal short. White to cream in colour under a thin translucent, straw-yellow to light brown periostracum. Operculum elongate-ovate, margins weakly corrugate through overlapping growth-rings.

Rachidians of radula narrow and concave with *c.* 10 small denticles, lateral accessory plate absent, lateral teeth biscuspid, cutting edge of inward pointing cusp with or without minute denticles (Verco 1907; Ponder 1968).

Figs. 81-83. *Nassarius(Cryptonassarius)ephamillus* (Watson). 81. Specimen from Chatham Rise, New Zealand, 585 m, NMNZ; 19.0 mm. 82. Specimen from Taiaroa Heads, Otago, New Zealand, 549 m; 13.0 mm. 83. Holotype of *N.dipsacoides* Hedley, AMS No. C-26624; 11.9 mm.

TYPE LOCALITY. E. of East Cape, 37°34'S & 179°22'E, 700 fathoms (1281 m), blue mud, 40°F (4.5°C), New Zealand *(ephamillus);* off New Zealand, 40°28'S & 177°43'E, 1100 fathoms (2013 m) [*dissimilis*]; 35 miles (56 km) E. of Sydney, New South Wales, Australia, 800 fathoms (1464 m) [*dipsacoides*]; Cape Jaffa, South Australia, 300 fathoms (549 m) [*flindersi*].

DISTRIBUTION. From the Chatham Is to mainland New Zealand, New South Wales along the eastern coast of Australia to Victoria, Sth.Australia, S.W. Australia and Tasmania. Subtidal, 146-2013 m, in blue mud, grey ooze, silt and bryozoa.

Type specimens. Five syntypes of *N.(C.) ephamillus* are in the BMNH No. 1887. 2.9.666-70, and the largest syntype, dimensions 13.6 x 8.3 mm (Cernohorsky 1975, fig.14) is here selected as the lectotype; the badly decorticated holotype of *N.dissimilis* is also in the BMNH No.1887.2.9.591., dimensions 13.5 x 9.5 mm. The holotype of *N.dipsacoides* is in the AMS No. C-26624, dimensions 11.9 x 7.2 mm (Fig. 83), and the holotype of *N.flindersi* is in the SAM No. D-13298, dimensions 8.8 x 5.1 mm.

Material examined. New South Wales: 56 km off Broken Bay, 33°32'S & 152°00'E, 823 m; E. of Broken Bay, 33°26'S & 152°11'E, 822-877 m; E. of Sydney, 34°03'S & 151°37'E, 295 m; 32 km N. E. of Wollongong, 34°15'S & 151°28'E, 457-484 m; off Wollongong, 34°27'S & 151°27'E, 1200 m and 34°22'S & 151°23'E, 439 m; E. of Brush I, 35°31'S & 150°46'E, 439; E.N.E. of Bateman's Bay, 35°37'S & 150°45'E, 384 m; E. of Ulladulla, 35°31'S & 150°48'E, 549 m; E. of Bermagui, 36°27'S & 150°19'E, 354-383 m; 32 km E. of Kiama, 36°37'S & 151°16'E, 503 m; 40 km E. of Twofold Bay, 37°27'S & 150°17'E, 294-304 m (all AMS); Victoria: S.E. of Gabo I, 37°48'S & 150°18'E, 484 m; S. of Gabo I, 366 m; 48 km S. of Cape Everard, 366 m; 61 km S. of Tamboon Inlet, off Gippsland, 38°24'S & 149°09'E, 988 m; between Cape Howe and Lakes Entrance, 38°13'S & 149°06'E, 146-158 m; midway between Cape Everard and Flinders I, Bass Str., 38°59'S & 148°34'E, 426 m (all AMS); Tasmania: off Cape Naturaliste, 40°51'S & 148°46'E, 399 m; 15 km E.S.E. of Cape Mistaken, Maria I, 42°02'S & 148°21'E, 695-713 m; 15 km N.E. of Tasman I, 43°12'S & 148°14'E, 571 m; S. of Hobart, 43°48'S & 147°50'E, 720-755 m (all AMS); South Australia: off Cape Martin, Beachport, 667 m (AMS); Cape Jaffa, 549 m (SAM); Encounter Bay, 36°00'S & 138°21'E, 450 m (ZMC); Western Australia: reported from 193 km W. of Eucla, 549 m (Cotton & Godfrey 1932). New Zealand: E. of East Cape, 37°34'S & 179°22'E, 1281 m; E. of Cape Turnagain, 40°28'S & 177°43'E, 2013 m (both BMNH); S.E. of Cape Palliser, Cook Str., 41°42'S & 175°29'E, 946-951 m; off Palliser Bay, Cook Str., 1007 m; S.W. of Cape Palliser, Cook Str., 41°44'S & 175°12'E, 732 m (both NMNZ); S.W. of Cape Foulwind, Tasman Sea, 42°10'S & 170°10'E, 610 m (coll.Powell); Chatham Rise, 43°35.5'S & 177°59'E, 586 m; Chatham Rise, 43°40'S & 179°28'E, 403 m; S.E. of Pitt I, 44°35.5'S & 176°04'W, 604 m (all NMNZ); N.E. of Taiaroa Heads, Otago, 45°45.6'S & 171°05'E, 549 m (NMNZ; coll. Powell).

For a detailed discussion of the species see Cernohorsky (1975).

SUBFAMILY CYLLENINAE Bellardi, 1882

Genus **Cyllene** Gray in Griffith and Pidgeon, 1834

Cyllene Gray in Griffith & Pidgeon, 1834, Anim.Kingd.Cuvier,Moll.&Radiata, 12:597. Type species by M *C.owenii* Gray in Griffith & Pidgeon, 1834. Recent, West Africa.

1924. *Radulphus* Iredale, Proc.Linn.Soc.N.S.W. 49:270. Type species by M *R.royanus* Iredale, 1924. Recent, S.E. Australia.

Species of *Cyllene* differ from other Nassariinae in their somewhat *Phos*-like appearance, the often prominently calloused and lirate columella and the presence of a sutural groove similar to the Olividae, where the posterior of the outer lip joins the body whorl.

Species of *Cyllene* live in the Indo-Pacific and West Africa, and to date are not known from other regions. Two species are known from Australia, one from the temperate region of S.E. Australia and the other from subtropical Western Australia. No species have been recorded from New Zealand.

Cyllene lactea A.Adams & Angas, 1864 (Fig. 84)

1864. *Cyllene lactea* A.Adams & Angas, Proc.Zool.Soc.Lond. for 1863:422; 1867 Angas, Proc.Zool.Soc.Lond.p.191; 1901 Hedley, Proc.Linn.Soc.N.S.W. 26(1): 19, pl.2,fig.10; 1903 Hedley, Mem.Austral.Mus. 4:375; 1918 Hedley, J.Proc.R.Soc.N.S.W. 51:M87.

1962. *Radulphus lacteus* Adams & Angas, Iredale & McMichael, Austral.Mus.Mem. No.11:73.

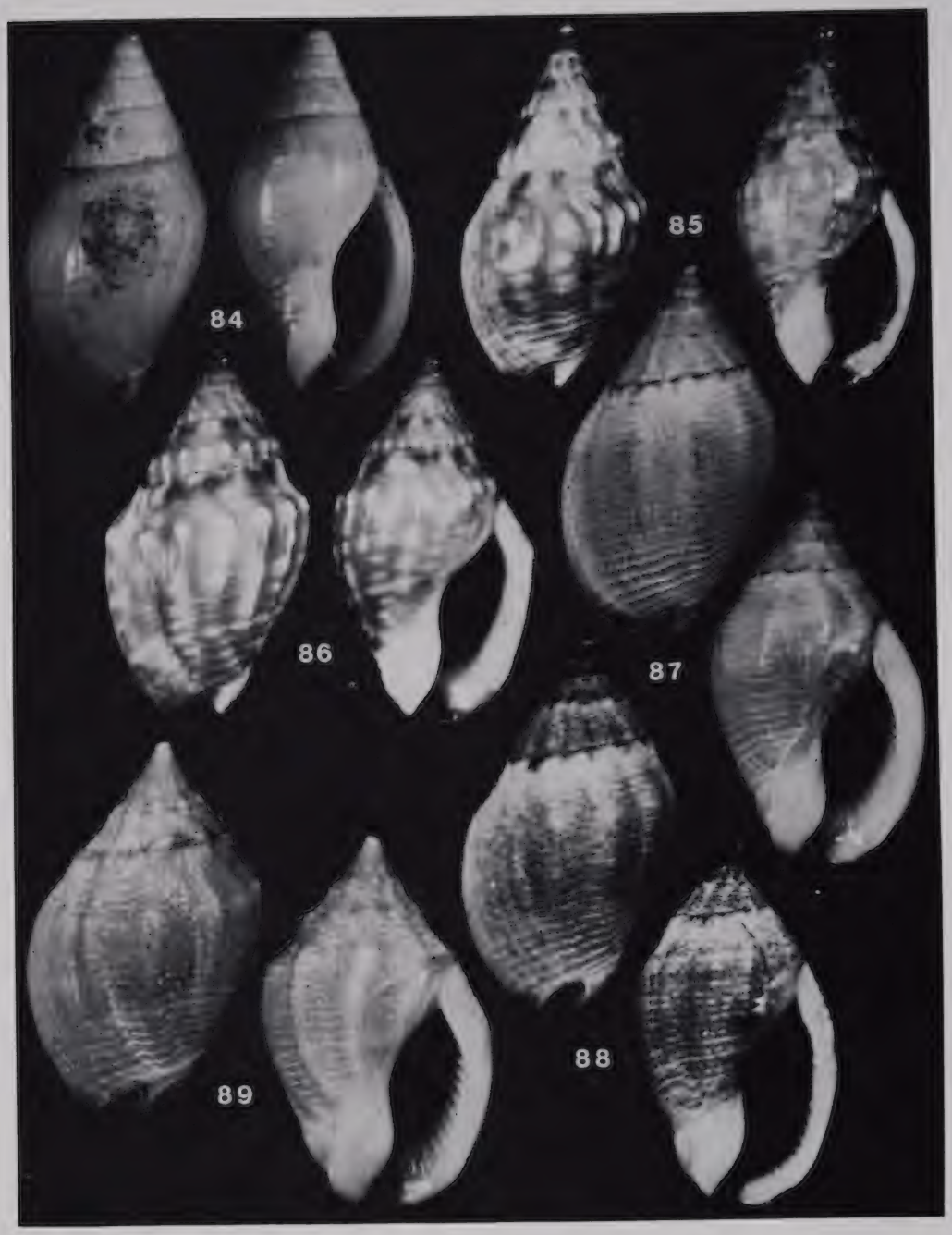
Shell up to 15.0 mm in length, elongate-ovate, teleoconch of 4¾-5 concavo-convex whorls, protoconch of 2 smooth, glassy embryonic whorls. Sculptured with axial ribs, ribs concavo-convex posteriorly to the sutures, 15-17 on penultimate whorl but absent or extremely weak on body whorl; spiral sculpture consists of spiral striae numbering 4-5 on penultimate whorl, shoulder of body whorl with 4-6 spiral cords, centre smooth, base of shell with up to 8-10 spirals. Outer lip thickened, interior of aperture finely striate, columella calloused, callus spreading on lower half of body whorl and with 7-9 oblique lirae, siphonal notch prominent. Fawn to light brown in colour and marbled with pale brown, sutures occasionally with brown spots.

TYPE LOCALITY. Port Stephens, New South Wales, Australia. According to Hedley (1901), Brazier identified the types as coming from inner North Head, Sydney Harbour, 8 fathoms (15 m).

DISTRIBUTION. Apparently endemic to New South Wales, Australia. Subtidal, 7-49 m.

Type specimens. Two faded syntypes of *C.lactea* are in the BMNH No. 1870.10.26.86., and the illustrated syntype (Fig. 84), dimensions 13.7 x 6.7 mm, is here selected as the lectotype.

Material examined.New South Wales: Port Jackson (coll.Powell); Six mile Beach, Port Stephens; off Green Pt., Watson's Bay, 7 m; Black Rock, Richmond River; Shelley Beach, Angourie; Woogoolga; Sydney Harbour; Long reef, Collaroy; Inner North Head, Port Jackson; Newcastle Bight, 44-49 m; Halliday's Pt., N. of Forster (all AMS); Simpson's Beach, Port Hacking (coll.Marrow).



Figs. 84-89. 84. *Cyllene lactea* Adams & Angas. Lectotype BMNH No. 1870.10.26.86.; 13.7 mm. 85.86. *C.royana* (Iredale). 85. Holotype AMS No. C-74642; 15.1 mm. 86. Broad specimen from off Lakes Entrance, Victoria, 37 m; 13.7 mm. 87-89. *C.sulcata* Sowerby. 87. Lectotype BMNH No. 1980106; 14.5 mm. 88.89. Specimens from Broome, W.Australia. 88. Slender form, 12.7 mm. 89. Broad, strongly ribbed form; 13.4 mm.

Cyllene royana (Iredale, 1924) (Figs. 85,86,90)

1924. *Radulphus royanus* Iredale, Proc.Linn.Soc.N.S.W. 49(3):270,pl.34, fig.8; 1962 Iredale & McMichael, Austral.Mus.Mem. No.11:73; 1962 Gabriel, Mem.Nat.Mus.Victoria No.25:188.

1962. *Radulphus royana* Iredale, Macpherson & Gabriel, Mar.Moll. Victoria Handb. No.2:196.

The species is very similar to *C.lactea* Adams & Angas, and differs only in the coarser sculpture which is mainly characterized by the presence of 14-15 axial ribs on the body whorl and which become angulate on the presutural ramp. The colouring is also similar with a white and brown marbling pattern and brown spots at sutures.

TYPE LOCALITY. Twofold Bay, New South Wales, Australia, 15-25 fathoms (27-46 m).

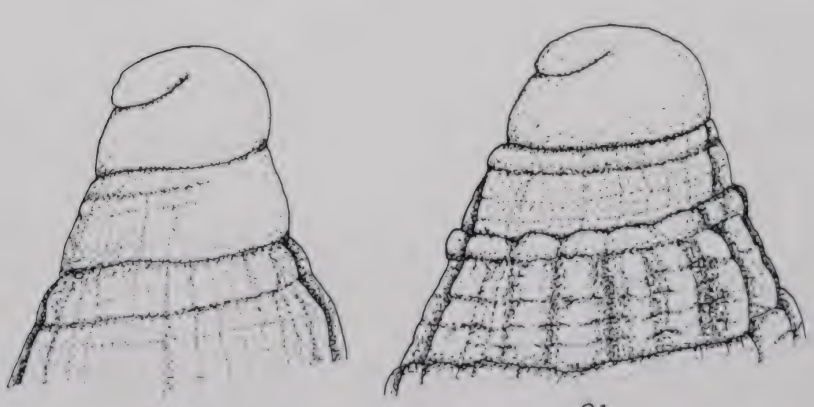
DISTRIBUTION. Recorded only from New South Wales and Victoria, Australia. Subtidal, 27-50 m.

Type specimens. The holotype of *C.royana* is in the AMS No. C-74642, dimensions 15.1 x 7.5 mm (Fig. 85).

Material examined. New South Wales: Middle Harbour, Sydney; Broken Bay; Ocean Beach (all AMS); Twofold Bay, 27-33 m (AMS; NMV); Victoria: off Lakes Entrance, 37 m (NMV; coll.Marrow).

Fossil record: Holocene: Bore at Tomaga, New South Wales, 16-17 m depth (AMS).

The species is rare and the range of variability is unknown. It is possible, however, that *C.royana* is only a sculptural variant of *C.lactea*, and *C.royana* is only tentatively accepted as a good species.



90 91

Figs. 90,91. Protoconchs. 90. *Cyllene royana* (Iredale). 91. *C.sulcata* Sowerby.

Cyllene sulcata Sowerby, 1859 (Figs. 87-89,91)

1854. *Cyllene sulcata* H. & A.Adams, Gen.Rec.Moll. 1:125 *(nom.nud.)*.
1859. *Cyllene sulcata* Sowerby, Thes.Conchyl. 3:77,pl.217,figs.10,11.

Shell up to 15.0 mm in length, elongate-ovate, some individuals broader than others, teleoconch of 5-5¼ flat-sided to concave whorls, protoconch of 1½-1¾ smooth, glassy embryonic whorls, sutures sharp and wavy. Sculptured with coarse, wide-spaced axial ribs which number 8-13 on penultimate and 8-11 on body whorl, ribs occasionally subangulate on presutural ramp of body whorl; spiral sculpture consists of close-set spiral threads which number 6-8 on penultimate and 25-32 on body whorl, siphonal fasciole with an elevated strong cord.Outer lip thickened, aperture with 14-17 lirae, columellar callus overlapping on to body whorl, columella with 8-10 oblique lirae, siphonal notch deep. Uniformly dull white to cream in colour, some individuals lined, spotted or suffused with greenish-brown, summits of sutures with small brown spots or short lines, columellar callus and edge of aperture white, deep interior frequently brown, protoconch brown and white.

TYPE LOCALITY. None. Broome, Western Australia here designated as the type locality.

DISTRIBUTION. Apparently endemic to Western Australia. Habitat unknown.

Type specimens. Two syntypes of *C.sulcata* are in the BMNH No. 1980106, and the illustrated syntype (Fig. 87), dimensions 14.5 x 8.1 mm, is here selected as the lectotype.

Material examined. Western Australia: Roeburne, Pt.Cloates (both AMS); Swan Pt. (NMV); Broome (NMV; coll.Marrow).

The species has remained unlocalized for over a century until the recent collection of specimens in Western Australia, and to date, the species is known only from that area.

ADDITIONAL TAXONOMIC NOTES

Australian species

Nassarius albinus (Thiele, 1930)

1852. *Nassa sinusigera* A.Adams, Proc.Zool.Soc.Lond. Pt.19:100 (Catbalonga, Samar I, Philippines).
1930. *Nassa albina* Thiele, Fauna Suedw.-Australiens 5(8):584,pl.4,fig.58.

TYPE LOCALITY. Shark's Bay, S.W. Australia.

Type specimens. The syntypes of *N.albinus* are in the ZMHU. They are the unbanded form of the widely distributed *N.sinusigerus* (Á.Adams,1852).

Nassarius australis (A.Adams, 1853)

1853. *Nassa australis* A.Adams, Proc.Zool.Soc.Lond. for 1851:272 (non *Buccinum australe* Menke, 1843 = *Nassarius)*.
1877. *Nassa clara* Marrat, Prop.new forms gen.*Nassa* p.7 (Hab: ?).

TYPE LOCALITY: Australia.

Type specimens. Three syntypes of *N.australis* are in the BMNH No. 197313.

The species is not endemic to Northern Australia but also occurs westward in the Indian Ocean. Due to secondary homonymy, *N.australis* has to be replaced by *N.clarus* (Marrat, 1877).

Nassarius compactus (Angas, 1865)

1850. *Nassa paupera* Gould, Proc.Boston Soc.Nat.Hist. 3:155 (Pacific Ocean).
1865. *Nassa compacta* Angas, Proc.Zool.Soc.Lond. p.154.
1974. *Nassarius(Hima)pauperus* (Gould), Cernohorsky, Venus: Jap.J.Malac. 33(2):51 (extended synonymy).

TYPE LOCALITY. St.Vincent's Gulf, Sth.Australia.

Type specimens. Four syntypes of *N.compactus* are in the BMNH No.1870.10.26.85. These are the banded form of the widely distributed Indo-Pacific *N.(Hima)pauperus* (Gould, 1850).

Nassarius comtessei (Iredale, 1929)

1832. *Buccinum conoidale* Deshayes in Belanger, Voy.Indes-Orient., Zool. p.433,pl.3,figs.6,7 (Seas of Sondé, Indian Ocean).
1929. *Niotha comtessei* Iredale, Austral.Zool. 5:349,pl.38,fig.13.

TYPE LOCALITY. Sydney Harbour, Australia.

Type specimens. The holotype of *N.comtessei* is in the AMS No. C-57847. This is an individual of *N.(Niotha)conoidalis* (Deshayes in Bélanger, 1832) (formerly *N.variegatus* A.Adams, 1852).

Arcularia grandior Verco, 1908

1908. *Arcularia grandior* Verco, Trans.R.Soc.Sth.Australia 32:344,pl.15, figs. 16,17 (off Beachport, Sth. Australia, 100-200 fathoms (183-366 m).
1959. *Fax grandior* (Verco), Cotton, Sth.Austral.Moll. p.382.

This South Australian deep water species is a member of *Fax* Iredale, family Buccinidae.

Nassarius hawleyi (Iredale, 1936)

1846. *Buccinum splendidulum* Dunker, Zeit.f.Malakozool. 3:170 (Hab:?).
1936. *Niotha hawleyi* Iredale, Rec.Austral.Mus. 19:322,pl.24,fig.11.

TYPE LOCALITY. Sydney Harbour, Australia.

Type specimens. The holotype of *N.hawleyi* is in the AMS No.C-60689. This individual is the species *N.(Niotha)splendidulus* (Dunker, 1846).

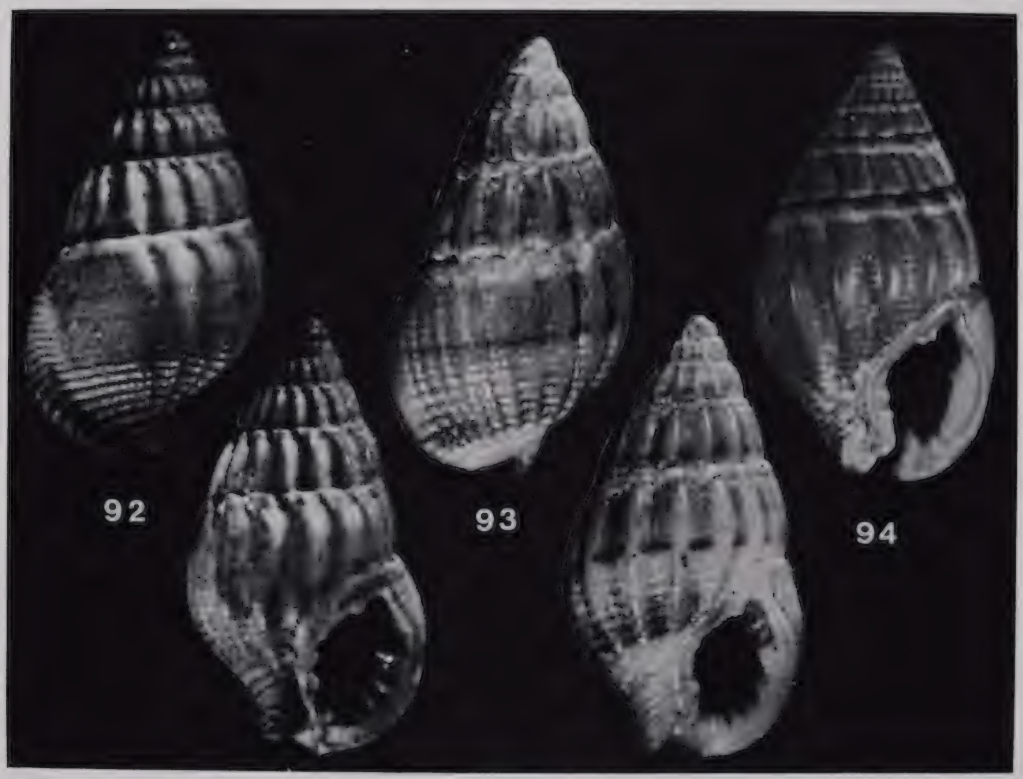
Nassarius minutulus (Thiele, 1930) (Figs. 92-94)

1907. *Nassa celebensis* Schepman, Samml.geol.Reichs-Mus.Leiden (1), 8:176, pl.11,figs.3,3a (Kajoeragi, Menado, Celebes, Quarternary of Indonesia).
1930. *Nassa minutula* Thiele, Fauna Suedw.-Australiens 5(8):584,pl.4,fig.59.
1977. *Nassarius(Niotha)marshallensis* Ladd, Geol.Surv.Prof.Pap. 535:55,pl.18,figs.6,7 (drill-holes on Enewetok, L. Miocene of Marshall Is).

TYPE LOCALITY. Shark's Bay, S.W.Australia.

Type specimens. The holotype of *N.celebensis* is in the Rijksmuseum van Geologie &Mineralogie, Leiden, No.RGM-102.440, dimensions 6.8 x 3.7 mm (Fig. 92). Syntypes of *N.minutulus* are in the ZMHU, and the illustrated syntype (Fig. 93), length 6.3 mm, is here selected as the lectotype. The holotype of *N.marshallensis* is in the USNM No.175063, dimensions 8.1 x 4.2 mm (fig. 94).

The species is not endemic to Western Australia but is synonymous with the Indo-West Pacific *N.celebensis* (Schepman, 1907).



Figs. 92-94. *Nassarius celebensis* (Schepman). 92. Holotype RGML No. 102.440; 6.8 mm. 93. Lectotype of *Nassa minutula* Thiele, ZMHU; 6.3 mm. 94. Holotype of *Nassarius marshallensis* Ladd, USNM No. 175063; 8.1 mm.

Nassarius optimus (Sowerby, 1903)

1903. *Nassa optima* Sowerby, J.Malac. 10:73,pl.5,figs.1,2.

TYPE LOCALITY. N.W. Australia.

Type specimens. The holotype of *N.optimus* is in the BMNH No. 1903.11.5.4. The species is not endemic to Northern Australia but has a restricted distribution ranging from New Caledonia to the Philippines and Indonesia.

Nassarius pilatus (Hedley, 1915)

1915. *Arcularia pilata* Hedley, Proc.Linn.Soc.N.S.W. 39(4):739,pl.84,fig.80.

TYPE LOCALITY. Darnley I, Torres Str., Nth. Australia, 12 fathoms (22 m).

Type specimens. Three syntypes of *N.pilatus* are in the AMS No. C-8071. These are the species *N.(Hima)pauperus* (Gould, 1850).

Cyllene striata A.Adams, 1851

1850. *Cyllene pulchella* Adams & Reeve, Zool. Voy.H.M.S.''Samarang'', Pt.2:33, pl.10,fig.11 (Borneo, Indonesia).
1851. *Cyllene striata* A.Adams,Proc.Zool.Soc.Lond. Pt.18:205.

TYPE LOCALITY. Albrokkas Is (= Albrolhos Is), W.Australia.

Type specimens. Three syntypes of *C.striata* are in the BMNH (no number). These specimens are synonymous with the tropical Indo-Pacific *C.pulchella* Adams & Reeve,1850.

Nassarius torresianus (Hedley,1915)

1901. *Nassa(Alectryon)idyllia* Melvill & Standen,Proc.Zool.Soc.Lond. p.410, pl.23,fig.12 (Gulf of Oman).
1915. *Arcularia caelata* var. *torresiana* Hedley, Proc.Linn.Soc.N.S.W. 39: 734,pl.83,fig. 76.

TYPE LOCALITY. Torres Strait, Nth.Australia, 12 fathoms (22 m).

Type specimens. Two syntypes of *N.torresianus* are in the AMS No. C-8072. These are individuals of *N.idyllius* (Melvill & Standen,1901) a species frequently cited under the homonymous name ''*Nassa ovoidea* Schepman,1911'' (non Locard,1886).

New Zealand species

Nassa (Tritiaria) cingulata Hutton,1885

1885. *Nassa(Tritiaria)cingulata* Hutton, Trans.Proc.N.Z.Inst. 17:327 (Greta, Canterbury, Pliocene of New Zealand); 1926 Finlay, Trans.Proc.N.Z. Inst. 56:239 (as *Zephos*).

This New Zealand species belongs in the Buccinidae and is the type species of *Zephos* Finlay,1926. The species is now assigned to *Cominella (Eucominia)*.

Hebra corticata (A.Adams,1852)

1852. *Nassa corticata* A.Adams,Proc.Zool.Soc.Lond. p.98.

TYPE LOCALITY. New Zealand = error.

Type specimens. Three syntypes of *N.corticata* are in the BMNH No.197326. The locality indication is incorrect and the species lives in the tropical Indo-West Pacific region.

Alectrion (Tritia) latecostata Suter,1917

1917. *Alectrion(Tritia)latecostata* Suter, N.Z.Geol.Surv.Palaeont.Bull. 5:36,pl.1,fig.8 (Pukeuri near Oamaru, New Zealand, L.Miocene).
1966. *Nassarius latecostatus* (Suter), Fleming, N.Z.Dept.Sci.Ind.Res.Bull. No. 173:63.

The species has been described from a juvenile individual which lacks any diagnostic features which would aid in associating it with the Nassariidae. It does resemble juvenile specimens of some Miocene buccinid species, particularly those of *Austrofusus* Kobelt. The species should be tentatively retained in the Buccinidae.

Radulphus necopinatus Finlay,1930

1855. *Cominella quoyana* A.Adams,Proc.Zool.Soc.Lond. Pt.22:313 (New Zealand).
1930. *Radulphus necopinatus* Finlay, Trans.Proc.N.Z.Inst. 61:236 (Cape Maria van Diemen, North I of New Zealand).

This species has been originally compared to the New South Wales *Cyllene lactea* Adams & Angas and *C.royana* (Iredale), but it is in fact the Cape Maria van Diemen form of *Cominella(Josepha)quoyana* A.Adams,1855, family Buccinidae.

Nassarius novaezelandiae (Reeve,1854)

1854. *Nassa novaezelandiae* Reeve,Conch.Icon. 8:pl.28,sp.186a,b.

TYPE LOCALITY. New Zealand = error.

Type specimens. Two syntypes of *N.novaezelandiae* are in the BMNH (no number). The locality indication is an error and the species lives in the tropical Indo-West Pacific region.

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REFERENCES

ADAMS, A.

1852-53 Catalogue of the species of *Nassa*, a genus of gasteropodous Mollusca belonging to the family Buccinidae, in the collection of Hugh Cuming, Esq., with the descriptions of some new species. *Proc.Zool.Soc.London* Pt.19:94-114 (pp.94-112 publ. 7 December 1852; pp. 113-114 on 29 April 1853).

ANDERSON, D. T.

1966 Further observations on the life histories of littoral gastropods in New South Wales. *Proc.Linn.Soc.New South Wales* 90(3):242-251.

CERNOHORSKY, W. O.

1972 Indo-Pacific Nassariidae (Mollusca:Gastropoda). *Rec.Auckland Inst.Mus.* 9:125-194, 162 textfigs.

1975 The taxonomy of some Indo-Pacific Mollusca. Part 3. With descriptions of new taxa and remarks on an Ecuadorian fossil species of Turridae. *Rec.Auckland Inst.Mus.* 12:213-234.

1977 The taxonomy of some Indo-Pacific Mollusca. Part 5. With descriptions of new taxa and remarks on *Nassarius albus* (Say). *Rec. Auckland Inst.Mus.* 14:121-132.

CHAPMAN, F.

1928 The Sorrento Bore, Mornington Peninsula, with a description of new or little-known fossils. *Rec.Geol.Surv.Victoria* 5(1):1-195, pls. 1-12.

CHEMNITZ, J. H.

1780 *Neus systematisches Conchylien-Cabinet.* Nuernberg, 4:1-344, pl. 122-159.

COTTON, B. C.

1955 Family Nassariidae. *R.Soc.Sth.Australia Malac.Sect.* No.7:1-3.

COTTON, B. C., and F. K. GODFREY

1932 South Australian Shells (including descriptions of new genera and species). Part IV. Fusidae, Nassariidae, Pyrenidae. *South Austral.Naturalist* 13(3):92-111, 1 pl.

DESHAYES, G. P., and H. M. EDWARDS

1844 *Histoire Naturelle des animaux sans vertèbres*. Ed.2. Paris 10:1-638.

HARRIS, G. F.

1897 *Catalogue of the Tertiary Mollusca in the Department of Geology British Museum (Natural History). Part I. The Australian Tertiary Mollusca.* London, pp. i-xxvi; 1-407, pl. 1-8.

HEDLEY, C.

1901 Studies on Australian Mollusca. Part IV. *Proc.Linn.Soc.New South Wales* 26(1):16-15, pl. 2.

1917 Same title. Part XIII. *Proc.Linn.Soc.New South Wales 41(4):680-719, pl. 46-52.*

HUTTON, F. W.
1887 Notes on some Australian Tertiary fossils. *Proc.Linn.Soc.New South Wales* (2) 1:481-482.

KIENER, L. C.
1834-41 *Spécies général et iconographie coquilles vivantes. Famille des Purpuriféres. Genre Buccin*. Paris 9:1-108, pl.1-31 (pp. 1-104 in 1834; pp. 105-112 in 1841).

LUDBROOK, N. H.
1958 The molluscan fauna of the Pliocene strata underlying the Adelaide plains, Part V — Gastropoda (Eratoidae to Scaphandridae). *Trans.R.Soc.Sth.Australia* 81:43-111, pl. 1-6.

MACPHERSON, J. H., and C. J. GABRIEL
1962 Marine Molluscs of Victoria. *Nat.Mus.Victoria Handb*. No.2: 1-475, textfigs.

PHILIPPI, R. A.
1847-51 *Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien*. Cassel 3:1-82; 1-138, 144 pl.

PONDER, W. F.
1968 Nomenclatural notes on some New Zealand rachiglossan gastropods with descriptions of five new species. *Rec.Dominion Mus*. 6(4):29-47, textfigs.

POWELL, A. W. B.
1952 New Zealand molluscan systematics, with descriptions of new species, Part 1. *Rec. Auckland Inst.Mus*. 4(3):169-185, pl. 35-36.
1976 On the considerable influx of warm water Molluscs that have invaded northern New Zealand waters within recent years. *Rec.Auckland Inst.Mus*. 13:141-166, textfigs.

REATH, J. L.
1925 Mollusca from sub-recent shell-beds of the lower Swan River. *J.R.Soc.W.Australia* 11(6):31-41.

REEVE, L.
1853-54 *Conchologia Iconica. Monograph of the genus Nassa*. London pl. 1-29, text.

ROBERTS, D., and F. E. WELLS
1980 The marine and estuarine molluscs of the Albany area of Western Australia. *Rec.W.Australian.Mus*. 8(3):335-357.

SUTER, H.
1913-15 *Manual of the New Zealand Mollusca; with an Atlas of quarto plates*. Wellington pp. i-xxiii, 1-1120 (text 1913); pl.1-72 (Atlas 1915).

TATE, R.
1888 The gastropods of the older Tertiary of Australia (Part I). *Trans.Proc.R.Soc.Sth.Australia* 10:91-176, pl. 1-13.
1889 Same title. (Part II). *Trans.Proc.R.Soc.Sth.Australia* 11:116-174, pl. 2-10.

The Editor
1975 Notes of interest. *Poirieria* 7(6):114-115.
1980 *Nassarius nigellus* (Reeve). *Austral.Shell News* No.'s 28-29:2, figs.

TRYON, G. W.
1882 *Manual of Conchology, structural and systematic. Families Nassidae, Turbinellidae, Volutidae, Mitridae*. Philadelphia 4:1:276, pl.1-58.

VERCO, J. C.
1907 Notes on South Australian marine Mollusca with descriptions of new species. Part VI. *Trans.Proc.R.Soc.Sth.Australia* 31:213-230, pl. 27-29.
1912 Notes on the marine shells of Western Australia, with descriptions of new species. Part II. *Trans.R.Soc.Sth.Australia* 36:192-205,pl. 15-16.

WILSON, B. R., and K. GILLETT
1971 *Australian Shells*. Sydney, 168 pp., 106 pl., textfigs.

THE TAXONOMY OF SOME INDO-PACIFIC MOLLUSCA

PART 9

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AUCKLAND INSTITUTE AND MUSEUM

Abstract. New geographical records are recorded for *Conus barthelemyi* Bernardi, *C. lentiginosus* Reeve, and *Sherbornia mirabilis* Iredale. The identity of *Cronia ochrostoma* (Blainville) is elucidated on the basis of its type specimen and *Nassarius barsdelli* Ladd from the Pleistocene of the New Hebrides is re-described. *Scabricola vicdani* from the Philippines and *Vexillum (Costellaria) malleopunctum* are described as new species of Mitracea.

Family MITRIDAE

Genus **Scabricola** Swainson, 1840

Scabricola Swainson, 1840, Treat. Malac. pp.130,319. Type species by SD (Gray, 1847) *Mitra serpentina* Lamarck, 1811 = *Voluta variegata* Gmelin, 1791. Recent, Indo-Pacific.

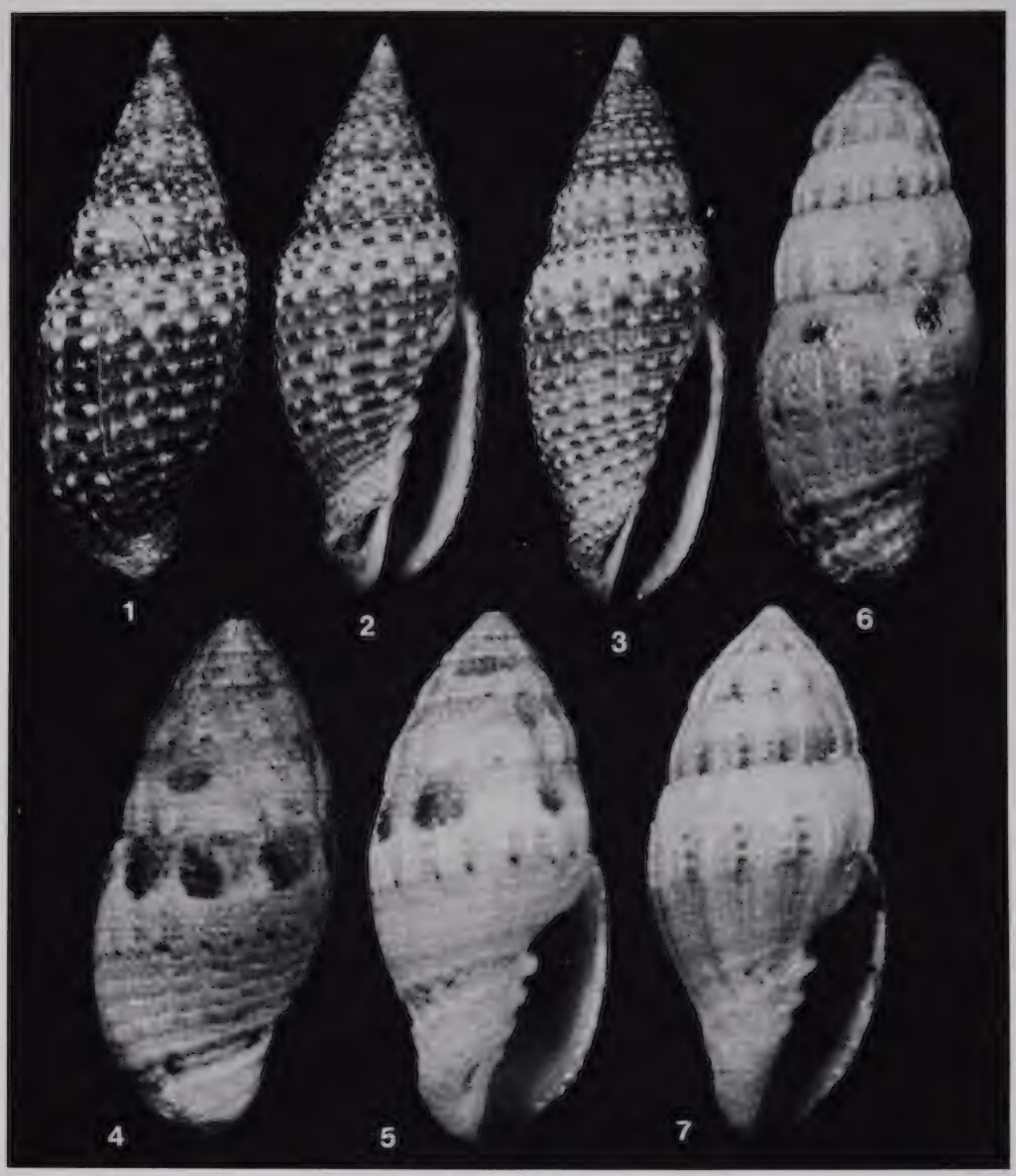
Scabricola vicdani sp. n. (Figs. 1-3)

Shell up to 43.0 mm in length, elongate-ovate, solid, width 35-39% of shell-length, teleoconch of 7½-8½ slightly convex whorls, protoconch partly missing on specimens examined. Sculptured with moderately elevated spiral cords which number 4-5 on penultimate and 13-15 on body whorl apart from 3-5 oblique cords on siphonal fasciole; interspaces concave and broader than cords, longitudinal sculpture consisting of crowded lirae which override spiral cords and render these bluntly granulose. Aperture narrow, longer than spire, 53-59% of shell-length, smooth within, outer lip thickened and bluntly crenulate, columella narrowly calloused and with 5-6 oblique folds, siphonal fasciole folded and always narrowly umbilicate in mature specimens, siphonal notch distinct. Base colour white, cream or pale orange, ornamented with a broad, orange-brown band on body whorl, cords ornamented with irregularly alternating white and orange-brown to reddish-brown spots, aperture pale orange-fawn.

TYPE LOCALITY. Punta Engaño, Mactan I, Cebu, Philippines, trawled in deep water by fishermen (depth indication not available).

Holotype. In AIM No. TM-1367, length 37.6 mm, width 14.0 mm, height of aperture 20.2 mm (Figs. 1,2).

Paratypes. No. 1 from type locality in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (30.3 x 10.2 x 17.8 mm). No. 2 from the type locality in the British Museum (Natural History), London (37.1 x 13.1 x 20.7 mm). No.'s 3-6 from the type locality in AIM; No.'s 7 and 8 from the type locality in coll. A. Deynzer and No.'s 9-12 from Panlao, Bohol, Philippines, *c.* 220 m depth, in coll. V. Dan.



Figs. 1-7. 1-3. *Scabricola vicdani* sp. n. 1,2. Holotype AIM No.TM-1367; 37.6 mm. 3. Paratype from Panlao, Bohol, Philippines; 36.5 mm. 4-7. *Vexillum (Costellaria)malleopunctum* sp.n. 4,5. Holotype WAM No. 430-80a; 20.3 mm. 6. Paratype; 21.8 mm. 7. Immature paratype; 18.5 mm.

None of the 13 specimens had a preserved animal and the assignment to *Scabricola* must remain tentative until a radula becomes available for examination. *S.vicdani* is similar to *S.angsanana* (K.Martin,1921) from middle Miocene deposits of Java, Indonesia, but the fossil species has groove-like, deeply pitted interspaces and lacks the folded siphonal fasciole and umbilical chink. It is also somewhat similar to the Recent

species *Neocancilla papilio* (Link,1807) in general shape and colouring but the latter species has a more slender body whorl, lacks the wider, concave interspaces and has a prominently different sculpture consisting of adjoining, alternating large and small spiral fillets and numerous intermediate spiral threads.

The new species is named for Mr Victor Dan, Manila, Philippines, who first brought this new species to my attention and who has been responsible for the discovery of several new molluscan species from the Punta Engaño area.

Family COSTELLARIIDAE

Genus **Vexillum** Roeding, 1798

Subgenus **Costellaria** Swainson, 1840

Costellaria Swainson, 1840, Treat.Malac. pp.130,320. Type species by M *Mitra rigida* Swainson, 1821 = *M. semifasciata* Lamarck, 1811. Recent, Indo-Pacific.

Vexillum (Costellaria) malleopunctum sp. n. (Figs. 4-7)

Shell up to 23.0 mm in length, elongate-ovate and somewhat pupiform, sutures adpressed, width 40-48% of shell-length, teleoconch of 6½-7½ convex whorls which occasionally become concavo-convex on the upper spire whorls, protoconch partly missing on specimens examined. Sculptured with moderately broad and low axial ribs which number 12-15 on the penultimate and 9-16 on the body whorl, ribs occasionally becoming obsolete towards the last third of the body whorl; spiral sculpture distinctly malleate, irregularly granulose adjacent to sutures followed by 5 spiral rows of small pittings on the penultimate and 10-12 rows on the body whorl, base of body whorl with 6-8 wavy and somewhat granulose cords. Aperture about equal in height or longer than the spire, 52-58% of shell-length, narrow and lirate within, outer lip thickened in adult specimens and obsoletely bluntly crenulate on anterior half, columella calloused and with 4-5 strong folds, siphonal notch moderately shallow. White in colour, body whorl with a broad, rose-coloured band, band occasionally bordered by small brown spots, sutures frequently with moderately large, squarish brown blotches, sutural spots occasionally absent, protoconch dark brown, aperture sometimes dark brown deep within.

TYPE LOCALITY. Capel, Geographe Bay, southwestern Australia, in 6.5 m, sand-pockets on limestone reef.

Holotype. In Western Australian Museum No. 430-80a, length 20.3 mm, width 8.9 mm, height of aperture 11.1 mm (Figs. 4, 5).

Paratypes. No. 1 from the type locality in AIM (21.7 x 8.8 x 11.4 mm) [Fig.6]. Immature paratypes No.'s 2 and 3 from the type locality in the Western Australian Museum No. 430-80b. Paratypes No.'s 4-6 from the type locality in coll. R. Walker. Paratypes No.'s 7 and 8 from the type locality in coll. G.M. Hansen. Paratype No. 9 from 3.2 km northwest of Busselton jetty, Geographe Bay, 22 m - 24 m, in the Western Australian Museum No. 3592, and paratype No. 10 from Bunbury, S.W. Australia, in coll. M. Marrow.

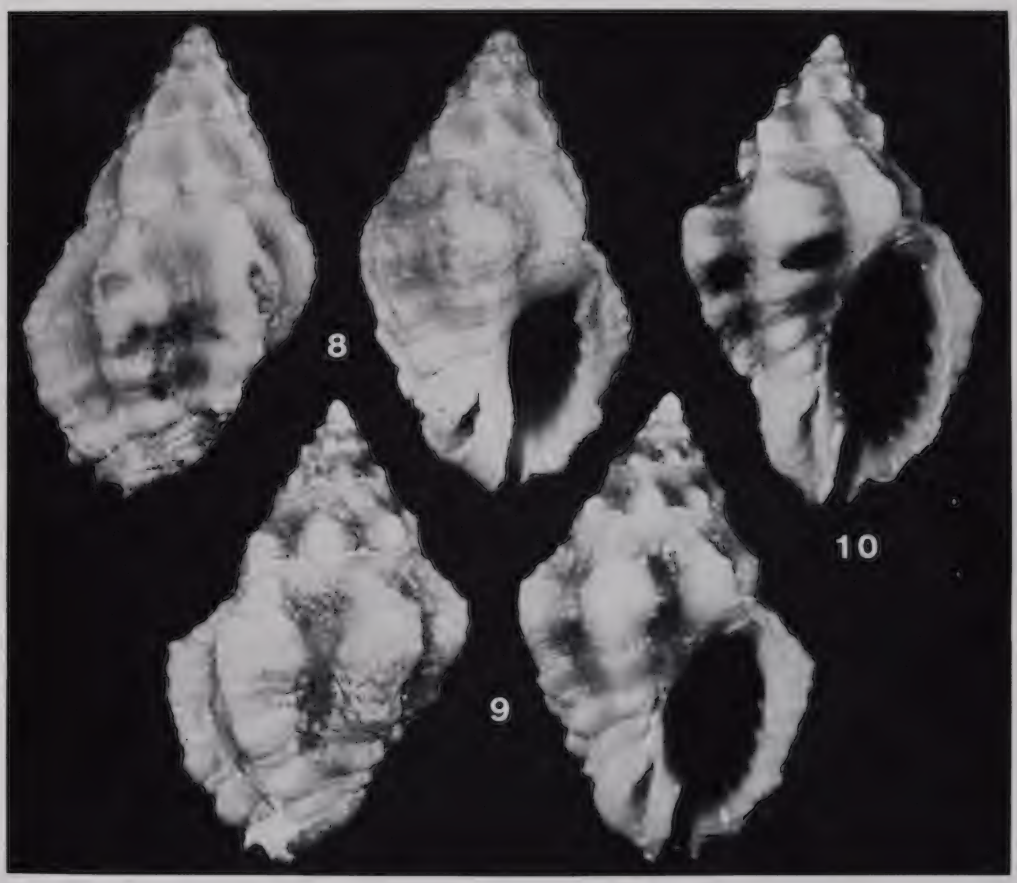
This new species has been known from a single specimen from the Bunbury area of Geographe Bay, S.W. Australia for several years. Specimens received recently by courtesy of Dr F. Wells, Western Australian Museum and Mrs G. M. Hansen and collected by Mr R. Walker and Mr J. Pas in the Geographe Bay area, confirm this to be a new species of Costellariidae.

The species is easily recognized by its pyriform shape, adpressed sutures, concavo-convex spire whorls and malleate surface. It can be compared with *Vexillum (Costellaria) modestum* (Reeve,1845), but this species has more angulate axial ribs and distinct spiral cords and lacks the pupiform shape, convex whorls and malleate surface of *V.(C.)malleopunctum*.

Family MURICIDAE

Genus **Cronia** H. & A. Adams, 1853

Cronia H. & A. Adams, 1853, Gen.Rec.Moll. 1:128. Type species by M. *Purpura amygdala* Kiener, 1835. Recent, Indo-Pacific.



Figs. 8-10. *Cronia ochrostoma* (Blainville). 8. Holotype Mus.Nat.d'Hist. Nat. Paris; 17.7 mm. 9. Specimen from Rabaul, New Britain, Papua New Guinea; 15.9 mm. 10. Specimen from off Kampong, N.W. Tajundu, Kai Is, Indonesia, USNM No. 748324; 16.4 mm.

Cronia ochrostoma (Blainville,1832) (Figs. 8-10)

1832. *Purpura ochrostoma* Blainville, Nouv.Ann.Mus.Hist.Nat. 1:205.
1976. *Cronia ochrostoma* (Blainville), Cernohorsky, Rec.Auckland Inst.Mus. 13:122, figs.31-34 (shell), figs.35,36 (radula) [detailed synonymy].

Kay (1979) when dealing with the species *Cronia ochrostoma* (Blainville), misinterpreted the identity of Blainville's species and illustrated the shell and radula of a Hawaiian *Drupella* species rather similar to *D.cornus* (Roeding, 1978). Kay (op.cit.) further remarked that she compared the Hawaiian shell with the type of *ochrostoma* in the Paris Museum and found them to be identical.

The interpretation of the taxon "*Purpura ochrostoma* Blainville" by Kay (op.cit.) and Cernohorsky (1976) are clearly conflicting and in the interest of taxonomic stability the identity of the species must be elucidated. The type specimen of *ochrostoma* has been received on loan from the Muséum National d'Histoire Naturelle, Paris, and the dimensions are length 17.7 mm, width 10.3 mm, height of aperture 9.4 mm. The type has 5 whorls and a worn protoconch, 6 broad axial ribs per whorl, 4 obsolete, heavy cords on the penultimate and *c.* 10 cords on the body whorl, the outer lip has 7 denticles and the columella 4 small basal denticles. The colour is off-white and slightly darkening between the axial ribs and the aperture is orange (Fig.8).

Compared with specimens from New Britian, Papua New Guinea (Fig.9) and the Kai Is, Indonesia (Fig.10), the type species of *C.ochrostoma* proves to be conspecific but differs appreciably from the "*ochrostoma*" of Kay (1979,fig.87B). The radula of the New Britian specimen illustrated here, has a typically *Cronia-Morula* type of radula (Cernohorsky, 1976, figs.35,36) and not a *Drupella* type of radula as illustrated by Kay (1979,fig.84.C.D).

Family NASSARIIDAE

Genus **Nassarius** Duméril, 1806

Nassarius Duméril, 1806, Zool.Analyt. p.166. Type species by SM (Froriep, 1806) *Buccinum arcularia* Linnaeus, 1758. Recent, Indo-Pacific.

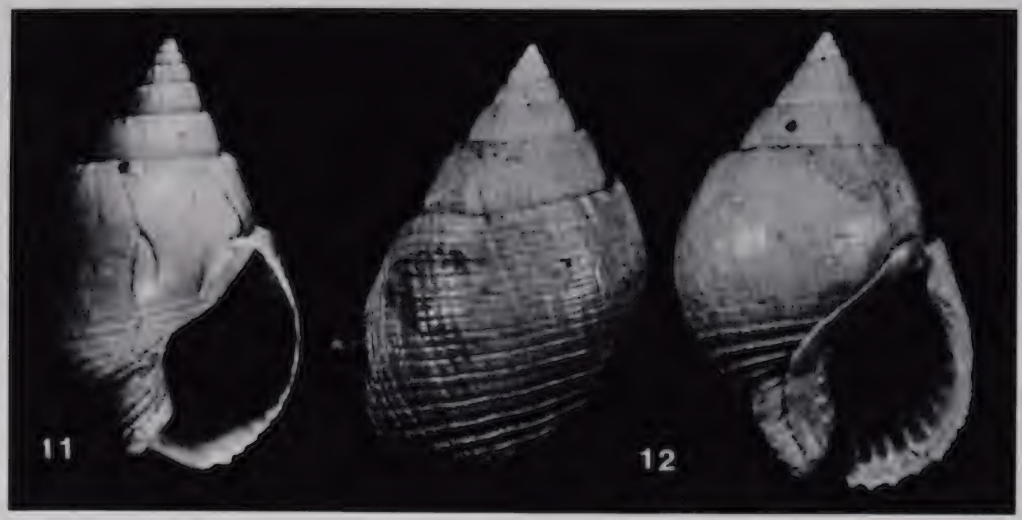
Nassarius barsdelli Ladd, 1976 (Figs. 11,12)

1976. *Nassarius (Alectrion) barsdelli* Ladd, Nautilus 90(4):131, figs.12-15.

Re-description: Shell up to 30.0 mm in length, broad and solid, teleoconch of 6¼ slightly convex whorls, protoconch of 3 finely keeled embryonic whorls, first 3-4 post-embryonic whorls with axial ribs and 3-4 over-riding spiral cords, sutures narrowly channeled and irregularly finely crenulate. Axial sculpture obsolete on last 3 whorls, body whorl with 11-17 spiral grooves on dorsal side, base with 4-5 strong cords and an additional 5-6 cords on the siphonal fasciole. Interior of aperture with 11 strongly lirate denticles, base of outer lip with 5-8 small denticles, columellar callus well defined but moderately narrow, columella with 9-11 prominent and slightly irregular denticles, siphonal notch deep. Some individuals with a preserved colour pattern show 2 broad, faded orange-brown bands on the body whorl.

TYPE LOCALITY. St.USGS-25715, Kere River, Santo I, Pleistocene of New Hebrides.

Type specimens. The juvenile holotype of *N.barsdelli* is in the National Museum of Natural History, Smithsonian Institution, Washington, No.USNM-214274, length 23.8 mm, width 14.7 mm (Fig.11).



Figs. 11,12. *Nassarius barsdelli* Ladd. 11. Juvenile holotype USNM No. 214274; 23.8 mm. 12. Mature topotype from Kere River, Santo I, Pleistocene of New Hebrides; 27.6 mm.

Ladd (1976) based his original description of *N.barsdelli* on a series of about 40 juvenile specimens but not a single adult individual. These specimens display features of a thin outer lip, uncalloused columella, edentulous aperture and thin texture of juvenile individuals. Additional specimens collected by Mr M. Barsdell at Kere River, Santo I, contained several mature individuals of the species, thus requiring a re-description based on fully adult specimens (Fig.12).

Family CONIDAE

Genus **Conus** Linnaeus, 1758

Conus Linnaeus, 1758, Syst.Nat. ed.10:712. Type species by SD (Children, 1823) *C.marmoreus* Linnaeus,1758. Recent, Indo-Pacific.

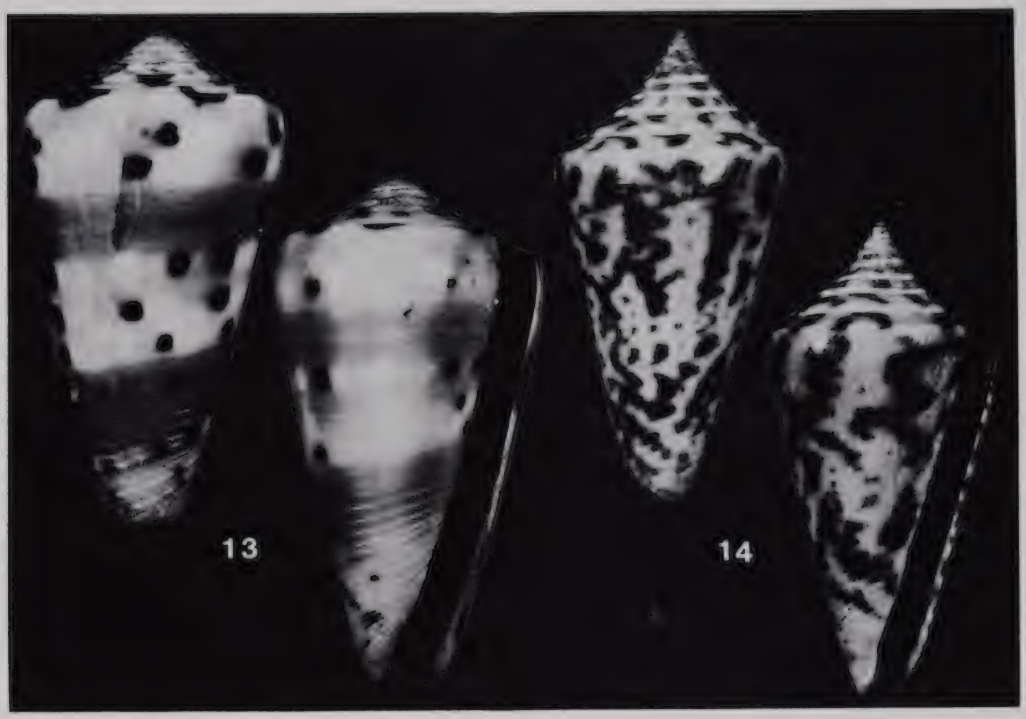
Conus barthelemyi Bernardi, 1861 (Fig.13)

1861. *Conus barthelemyi* Bernardi, J. Conchyl. 9:285; 1862 Bernardi, J.Conchyl. 10:46, pl.1,fig.12; 1979 Walls, Cones shells p.199, figs.on p.145.
1977. *Conus (Rhizoconus) paradiseus* Shikama, Sci.Repts.Yokohama Nat.Univ. sec.2, No.24:20,pl.4, figs.2a,b; pl.5,fig.6.

TYPE LOCALITY. Diego Garcia, Chagos Archipelago, Indian Ocean *(barthelemyi)*; Indian Ocean *(paradiseus)*.

This rare species has only become more widely known during the last 10 years and most specimens collected originated from Mauritius, Reunion and the Comores Is, south-western Indian Ocean. The record of a specimen of *C.barthelemyi* from Guadalcanal, Solomon Is (ex-N.Potter) is a considerable eastward range extension and the first record from the western Pacific (Fig.13).

Walls (1979) placed *C.gauguini* Richard & Salvat,1973, from the Marquesas Islands in the synonymy of *C.barthelemyi* and at the same time expressed some doubt as to the correctness of the type locality. *C.gauguini* has in the meantime been confirmed as living in French Polynesia, and although closely similar to *C.barthelemyi*, it always lacks the round, blackish-brown spots on the body whorl. It appears to resemble more closely some individuals of *C.circumcisus* Born, in colour pattern.



Figs. 13,14. 13. *Conus barthelemyi* Bernardi. Guadalcanal, Solomon Is; 55.0 mm.
14. *C.lentiginosus* Reeve. Guadalcanal, Solomon Is; 40.3 mm.

Conus lentiginosus Reeve, 1844 (Fig. 14)

1844. *Conus lentiginosus* Reeve, Conch.Iconica 1:pl.44,sp.245; 1979 Walls, Cone shells, p.634, figs. on p.408.
1854. *Conus optabilis* A.Adams, Proc.Zool.Soc.Lond. Pt.21:116.
1855. *Conus selectus* A.Adams, Proc.Zool.Soc.Lond. Pt.23:121.

TYPE LOCALITY. None *(lentiginosus* and *optabilis);* Malacca, Indonesia *(selectus).*

C. lentiginosus is best known from India where most of the specimens have been collected. *C.optabilis* is a form of *C.lentiginosus* lacking a definite colour pattern while the holotype of *C.selectus* is a slightly squatter and broader form which lacks the flammulate colour pattern and retains only 7-8 spiral rows of small spots. The species is recorded here from Guadalcanal, Solomon Islands (ex-N.Potter) which is a considerable eastward range extension from Indonesia (Fig.14).

Superfamily CERITHIOPSACEA H. & A. Adams, 1853

Family SHERBORNIIDAE Iredale, 1917

Genus **Sherbornia** Iredale, 1917

Sherbornia Iredale, 1917, Proc.Malac.Soc.Lond. 12:331. Type species by M *S.mirabilis* Iredale, 1917. Recent, Indian Ocean.

Sherbornia mirabilis Iredale, 1917 (Figs.15-19)

1917. *Sherbornia mirabilis* Iredale, Proc.Malac.Soc.Lond. 12:331,pl.13,figs. 1-4; 1940 Wenz, Handb.Palaeozool. 6:787,figs.2286; 1980 Marshall, New Zealand J. Zool. 7:87.

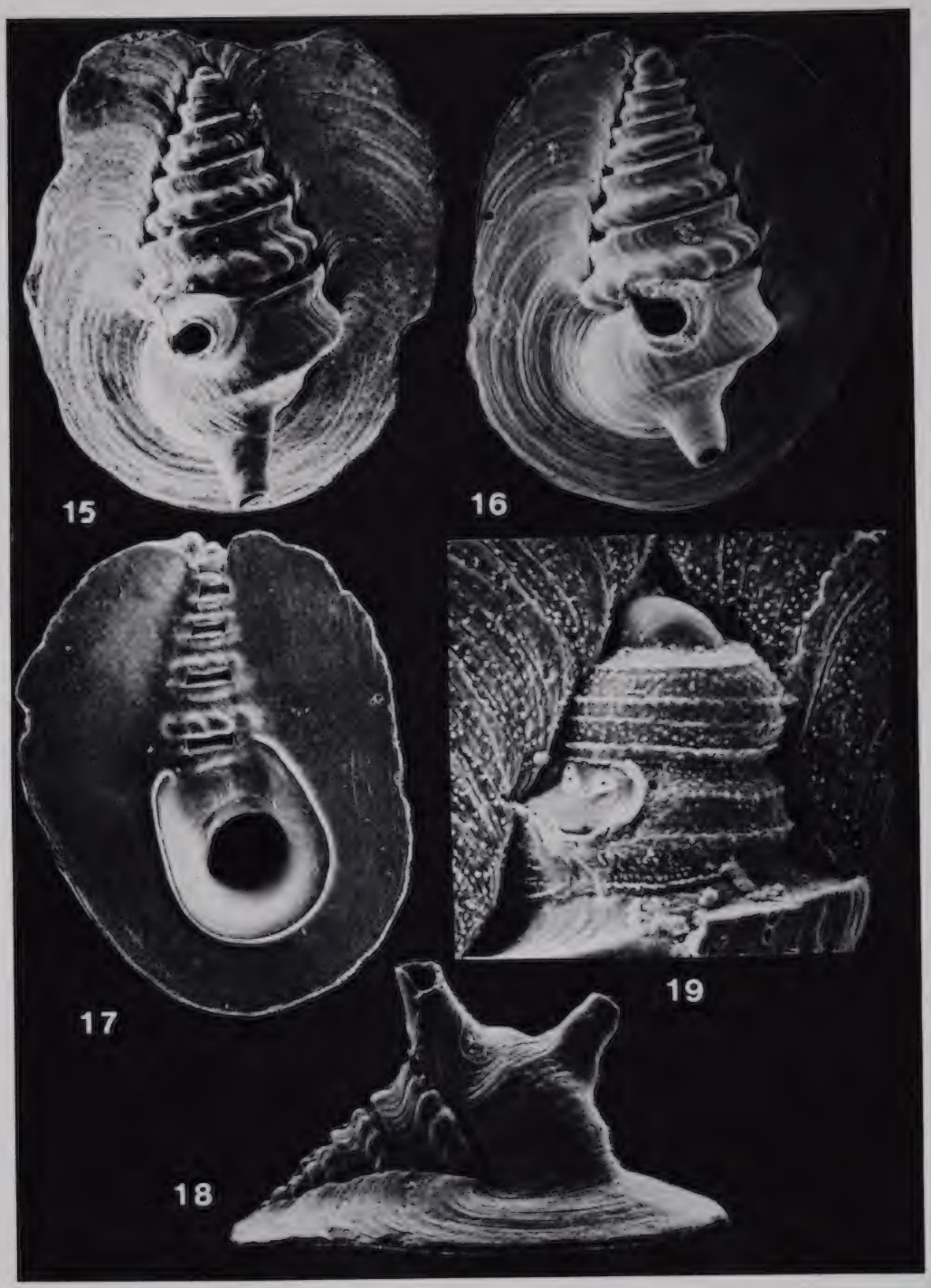
TYPE LOCALITY. North-East Point, Christmas Island, Indian Ocean, 100 fathoms (183 m), rich foraminiferal sand with shells and corallines.

Iredale (1917) described a minute (3.0 mm) bizarre-looking gastropod mollusc from Christmas I, Indian Ocean as *Sherbornia mirabilis* and erected the new family Sherborniidae which he placed next to the Triphoridae (type *Triphora* Blainville) containing sinistrally coiled shells. Marshall (1980) placed the Sherborniinae as a subfamily of Triforidae (type *Triforis* Deshayes) a family containing dextrally coiled gastropods. Until recently no specimens of *S.mirabilis* have been collected since the date of description and several authors even omitted the genus and species from their systematic arrangements.

Specimens of *S.mirabilis* have now been collected in the Pacific at Moruroa Atoll (*leg*. C.Beslu) and also in shell-sand at Anaa I, Tuamotu Archipelago (*leg*. J.Trondle). These specimens measure 1.8-2.1 mm in length, whorls are angulate and channeled at sutures and concavely indented centrally and sculptured with crowded, arcuate axial striae and rounded nodes at the anterior of sutures. Aperture is dextral and the whole ventral side of the shell is merged into a broad, oval and thin calcareous plate with primary and secondary concentric growth-striae; the dorsal side of the body whorl has 2 posterior and 1 anterior tubular canal. Shells are uniformly white, but they have all been collected devoid of animal (Figs. 15-19).

This new Polynesian record establishes the species Pacific distribution. It is either rare or usually overlooked because of its minute size. Mr B. Marshall, National Museum of N.Z., a specialist in this group of gastropods, will treat the species in greater detail in a forthcoming paper.

Acknowledgements. For the loan of molluscan specimens I would like to thank Mr M. Barsdell, formerly of the New Hebrides Geological Survey; Mr C. Beslu and Mr J. Trondle, Papeete, Tahiti; Dr J.S. Buckeridge, Carrington Technical Institute, Auckland; Mr V. Dan, Manila, Philippines; Major A. Deynzer, Sanibel I, Florida; Mrs G. Hansen, Victoria Park, Western Australia; Mr N. Potter, Auckland; Mr R. Walker, Western Australia, and Dr F. Wells, Western Australian Museum, Perth. I am grateful to Dr P. Bouchet, Muséum National d'Histoire Naturelle, Paris, for the loan of the type specimen of *Purpura ochrostoma* Blainville, and Mr B. Marshall, National Museum of New Zealand, Wellington, for Scanning Electron Microscope photographs of *Sherbornia mirabilis* and pertinent discussion concerning this species.



Figs. 15-19. *Sherbornia mirabilis* Iredale. Moruroa Atoll, Tuamotu Archipelago. 15,16. Dorsal view; 1.8 mm and 2.1 mm respectively. 17. Ventral view; 1.8 mm. 18. Lateral view; 1.8 mm. 19. Protoconch.

REFERENCES

CERNOHORSKY, W.O.

1976 The taxonomy of some Indo-Pacific Mollusca. Part 4. With descriptions of new taxa and remarks on *Nassarius coppingeri* (Smith). *Rec.Auckland Inst.Mus.* 13: 111-129., textfigs.

IREDALE, T.

1917 On some new species of marine Mollusca from Christmas Island, Indian Ocean. *Proc.Malac.Soc.London* 12: 331-334, pl.13.

KAY, E.A.

1979 Hawaiian Marine shells. Reef and shore fauna of Hawaii. Section 4: Mollusca. *Bernice P.Bishop Mus.Spec.Publ.* 64(4): i-xviii, 1-653, 195 textfigs.

LADD, H.S.

1976 New Pleistocene Neogastropoda from the New Hebrides. *Nautilus* 90(4): 127-138, textfigs.

MARSHALL, B.A.

1980 The sytematic position of *Triforis* Deshayes (Mollusca: Gastropoda). *N.Z. J. Zool.* 7:85-88.

WALLS, J.G.

1979 *Cone shells, a synopsis of the living Conidae*. T.F.H. Publ.Inc., Neptune City, N.J., U.S.A. 1011p., textfigs.

A NOTE ON THE OCCURRENCE OF *Myrmecia brevinoda* (HYMENOPTERA : FORMICIDAE) IN NEW ZEALAND

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Abstract. Five records of an Australian bulldog ant, *Myrmecia brevinoda* Forel, in New Zealand are discussed with a comment on the species possible establishment.

Myrmecia brevinoda Forel, an Australian bulldog ant, was first found in New Zealand at Milford, on Auckland's North Shore, in September 1940. There is one specimen from this occurrence, collected by W.H. Smith, in the Auckland Museum, but there are no specific locality details.

The species was taken again at an address in Oxford Tce, Devonport, also on Auckland's North Shore, in December 1948, by A.W. Joughin. A few specimens were collected from a property half way along the west side of the street; no nest was found and no further action was taken (A.W. Joughin pers. comm.). One large specimen from this collection is in the Auckland Museum. One other specimen, in the New Zealand Arthropod Collection, DSIR, Auckland, is labelled North Shore, 9 October 1949, Mr Jockin. This is undoubtedly a mis-spelling of Joughin (possibly arising from the spoken name) and the specimen may have been received by DSIR in 1949 without written data.

It appears that Brown, in his 1958 review of New Zealand ants (Brown 1958), based his comments on the above two records. He wrote, "Apparently the species has managed to maintain itself in the district for some time, but its present status is not known".

In April 1965, the Agriculture Quarantine Service was notified when a nest was found in a domestic lawn at 19 Oxford Tce, Devonport. A wooden crate, recently brought from Australia and which was sitting on the lawn, was thought to be the means of introduction at the time and the nest was destroyed. A limited survey of the area was carried out by Ministry staff, but no further bulldog ants were found. Specimens have been deposited with Entomology Division, DSIR, the Plant Health Diagnostic Station, Levin and Auckland Museum. In October 1979, the author visited the area and this address in particular. The people resident there in 1965 had moved and the new owners had never heard of or seen any bulldog ants.

There is a single specimen of *Myrmecia brevinoda* in the collection of the Plant Health Diagnostic Station, MAF, Auckland, said to have been collected somewhere in Auckland on 23 August 1971 by M.A. Knight. There is no other data concerning the specimen.

Rec. Auckland Inst. Mus. 18: 203-204 18 December 1981

In March this year (1981) the species was discovered again in Devonport and its presence reported. A nest was found in the ground between the footpath and gatepost of 15 Oxford Tce, Devonport. The owners of this property have lived there for the last 10 years, but had only noticed foraging bulldog ants for the previous year or so. They were usually seen in the evening. Agriculture Quarantine staff visited the address on several occasions and the nest was destroyed. A large number of specimens were collected, including workers, males, larvae and pupae. No queen was found although the nest was completely excavated. Specimens have been sent to a number of institutions in New Zealand and Australia, including the Auckland Museum.

The occurrence of the species on three separate occasions, in 1948, 1965 and 1981, on the same side of the same street would seem to indicate the species establishment in the area rather than three separate introductions from Australia. It is interesting however that the species has not been reported more often than it has, since the ants are large (15-20 mm) and aggressive, and easily distinguished from other ants in the region. Brown (1958) says of the species, "It is a ground nesting form, and forages principally at night, at least during warm weather; it should be sought on the trunks of trees with a light". The species nocturnal behaviour and apparently limited distribution could be factors contributing to the infrequency of sightings.

While bulldog ants are not of economic importance in Australia they are well known for their potent sting, an aspect of their behaviour which also makes their presence in New Zealand undesirable.

Acknowledgements. I am grateful to Dr R.W. Taylor, CSIRO, Canberra, for confirmation of the identity of the 1981 specimens; Mr K.A.J. Wise, Auckland Institute and Museum, and Dr T.K. Crosby, Entomology Division, DSIR, for access to specimens in their respective collections; Mr R.G. Sunde, Plant Health Diagnostic Station, MAF, Auckland, for details of the 1971 record; Mr R.F. Winch, Agriculture Quarantine Service, MAF, Auckland, for details of the 1965 occurrence; Mr A.W. Joughin, Devonport, for information given in July 1981; and Mr and Mrs A.W. Emerson, 15 Oxford Tce, Devonport, for bringing the most recent occurrence to our attention and for their cooperation with Ministry staff in dealing with the situation.

REFERENCES

BROWN, W.L., Jr.
1958 A review of the ants of New Zealand. *Acta Hymenopterologica* 1 (1): 1-50.

A NEW SPECIES OF *Xanthocnemis* Tillyard (ODONATA: COENAGRIONIDAE) FROM THE CHATHAM ISLANDS, NEW ZEALAND

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Abstract. Xanthocnemis tuanuii n.sp. is described from Chatham Island, New Zealand. It is closely related to the New Zealand mainland species *X. zealandica* but differs largely in the form of the male superior appendages. There also appear to be consistent differences in colour pattern.

The earliest description of a New Zealand Coenagrionid was that of *Telebasis zealandica* by McLachlan (1873). Tillyard (1913) subsequently erected the genus *Xanthocnemis* for McLachlan's species and synonymized other species which had been described from the main islands of New Zealand (*Telebasis sobrina* McLachlan, 1873, *Xanthagrion antipodum* Selys, 1876) with *X. zealandica* (these synonymies will be further discussed in a revision of the genus being prepared by the present author).

However, the Chatham Island *Xanthocnemis* was recognized as being different from those familiar to collectors on the main islands of New Zealand. Hutton (1898) noted differences and assigned Chatham Island specimens to *X. sobrina* (followed and quoted in Hudson 1904), and Tillyard (1913) commented on their large size, "specimens . . . from Chatham Island are exceptionally fine, and the largest of the whole series".

The Chatham Islands are 800 km east of the South Island, New Zealand. In January, 1980, I collected Odonata in the undisturbed rainforest area at the southern end of Chatham Island, which is the northern and largest island of the group. Differences between the *Xanthocnemis* population of that island and those of the main islands of New Zealand were noted during field observations; and from further morphological examination it is concluded that this island population warrants specific recognition. *X. zealandica* was not found on Chatham Island.

Xanthocnemis tuanuii Rowe, sp.n. (Figs. 1-6)

MALE (based on 11 specimens)

Length 33 - 36 mm (anterior margin of head — posterior margin of abd X).

Head. Labrum buff with three triangular basal black spots, lateral spots sometimes reduced. Postclypeus yellow-orange. Frons bronze-black. Vertex, anterior area orange; base bronze-black, the straight or slightly convex division lying below antennae. Epicranium bronze-black with pair of large red postocular spots joined by red line across posterior margin to form a "dumb bell". Postocular spots sometimes bifurcated or reduced. Antennae with orange distal annulus on basal segement; second segment large, usually red; other segments bronze-black. Eyes red. Back of head pale with small elongated yellow-orange splash on eye margin. Frontal and dorsal surfaces with thick covering of long black hairs.

Prothorax. Anterior lobe orange. Dorsum bronze-black with lateral orange triangles, vertices opposing. Two osculating orange spots on posterior area of central lobe (missing in one specimen). Lateral areas orange. Posterior lobe narrow, orange with fringe of long black hairs; central area of posterior lobe black in one specimen.
Synthorax. (Fig. 1). Mesepisternum, mesepimeron bronze-black with orange markings; ventrally yellowish-buff. Diffuse black spot below metathoracic spiracle. Prothorax and synthorax closely covered with long black hairs overall.
Legs. Coxae and trochanters orange with black markings. Femur and tibia red-orange with small black basal markings and two rows of long black spines.
Wings. Hindwing length 18.5 - 20.5 mm. Venation dark red-brown. Pterostigma red, covering 1½ (rarely 1) cells.
Abdomen. Red with black (dorsal) markings as follows. Abd I with bilobed basal spot (absent in 2 of 11 specimens). Abd II-V with apical rings. Abd VI with apical spots and incomplete ring (markings fused in 3 of 11 specimens). Abd VII with pair of longitudinal bars and apical ring, 9 of 11 specimens with a narrow red expansion to produce a red † dorsal mark. Abd VIII with pair of longitudinal bars. Abd IX, X with basal spots (absent in 2 of 11 specimens). Abd I, II covered in long black hairs.
Anal appendages. (Figs. 2-5). Superiors bifurcated. Upper lobe red-orange with heavy black dorso-interior spine and small black ventrodistal spine. Lower lobe paler. Massive, especially in caudal view, converging, tips opposing, tip drawn into massive dorsally directed projection. Inferiors approximately 1½ x length of superiors, red-orange, forcipate, opposing tips black.
Penis. Broader than in *X. zealandica*, shaft with lateral flanges lying below curved horns of glans (Fig. 6).
FEMALE heterochrome (based on 4 specimens)
Head. Labrum buff with broad black basal line. Postclypeus buff. Frons bronze-black. Epicranium as for male except "dumb-bell" buff. Antennae as for male.
Prothorax. Dorsally bronze-black with yellow lateral surfaces. Anterior lobe broad, yellow. Central lobe with yellow lateral spots. Pair of central spots on posterior edge of central lobe in 2 of 4 specimens. Posterior lobe narrow, yellow with fringe of long black hair.
Synthorax. Largely as for male but markings yellow on bronze-black. Large yellow triangle with apex directed posteriorly at centre of anterior edge of mesepisternum.
Legs. Yellow with heavy black markings. Femur with broad, black, exterior line. Spinose.
Wings. As for male.
Abdomen. Dorsally bronze-black, ventrally and laterally yellow. Abd I with (in 3 of 4 specimens) a yellow spot at posterior dorsal margin. Abd III - VI with incomplete yellow rings at anterior edge.
FEMALE androchrome (based on 6 specimens)
Colour pattern largely as in male with the following exceptions.
Head. Labrum buff, basal spots joined by basal black line. Epicranium postocular spots reduced.
Prothorax. Central spots on posterior margin of median lobe frequently absent.
Synthorax. Large red triangle at anterior edge of mesepisternum.
Abdomen. Black markings on abdomen considerably more extensive than in male. Abd VIII - X dorsally black.

Specimens examined. Holotype ♂, Allotype ♀ androchrome, taken *in copula*. CHATHAM I: brown water, forest stream on southern bank of Tuku a tamatea R, approximately 800 m into the forest east of the ornithologists' camp 'Tuku Base', near NZMS 240 879916 (interpolated), approximately 44°04'S, 176°38'W, 22.I.1980, R.J. Rowe. Both deposited in Auckland Institute and Museum.

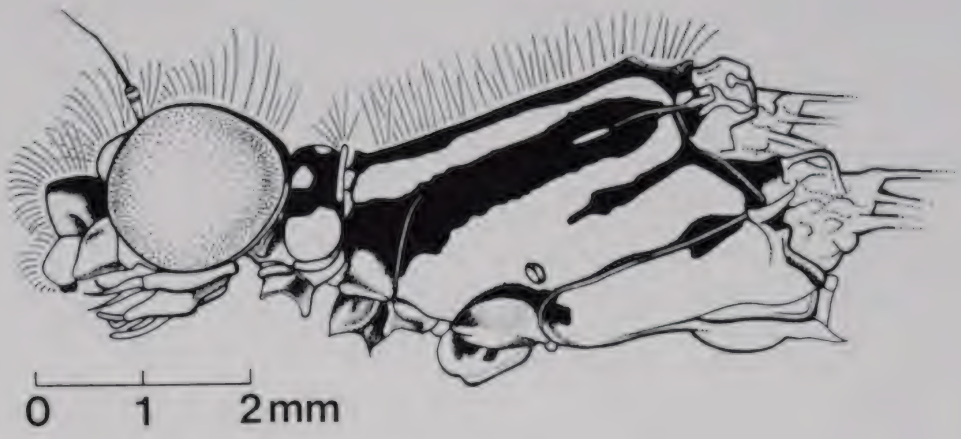
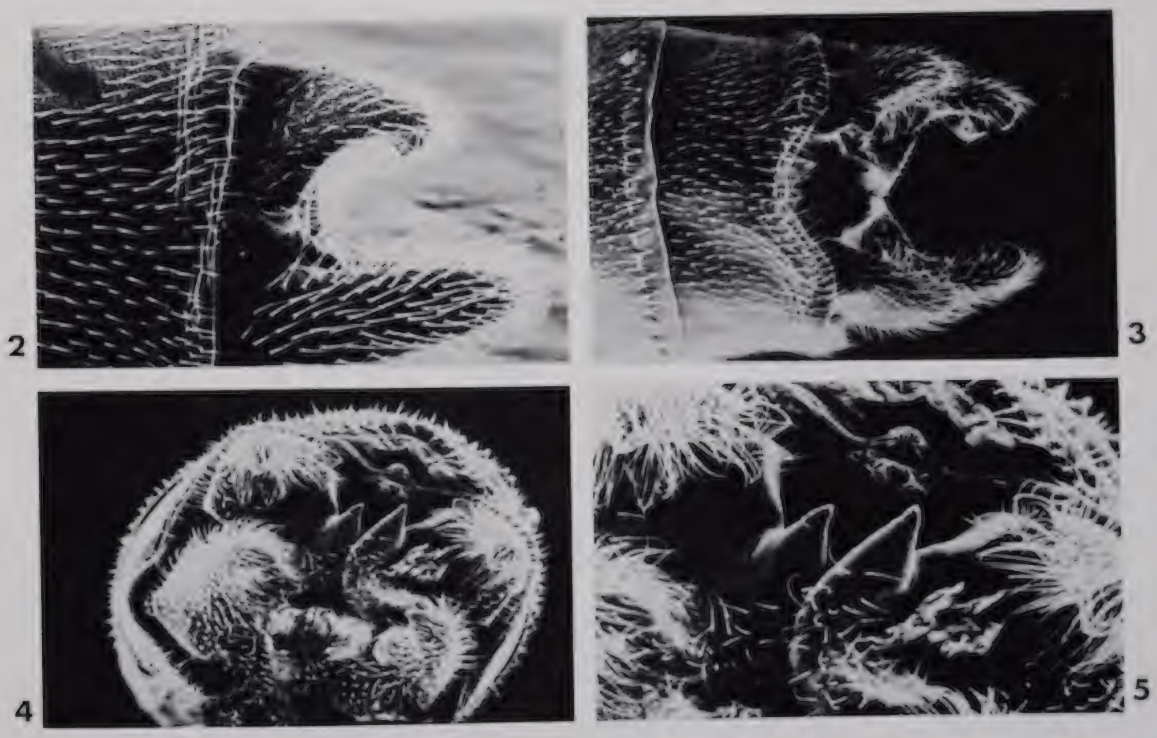


Fig. 1. *Xanthocnemis tuanuii* n.sp. Holotype♂. Head and thorax, lateral (length of dorsal hairs indicated).



Figs. 2-5. *Xanthocnemis tuanuii* n.sp.♂ from 'Tuku Base'. Anal appendages. 2. Lateral. 3. Dorsal. 4. Caudal. 5 Caudal, detail.

Fig. 6. *Xanthocnemis tuanuii* n.sp.♂ genitalia, ventral.

Paratypes. Five pairs taken *in copula*, same data as holotype. Deposited in: Auckland Institute and Museum; Entomology Division D.S.I.R.; Canterbury Museum; British Museum (Natural History); Australian National Insect Collection, C.S.I.R.O. Four males, same data as holotype, retained in the author's collection.

Other material. CHATHAM I. (Canterbury Museum) 3♂♂, 1♀, Chatham, 24 1.1924, C. Lindsay. (D.S.I.R. Entomology Division) 3♂♂, 2♀♀, L. Te Roto, Awatotara Tableland; 2♂♂, 1♀, Kaingaroa, Waitangi,-.II. 1967, G. Ramsay;♂, ♀ Awatotara, Waikato Pt,-.II. 1967, G. Kuschel. (Rowe Collection) 6♂♂, 5♀♀, Tuku a tamatea R., bush runnels near Tuku Base, -.I.1980, R.J.R.

Neither Hutton's (1898) material nor the material viewed by Tillyard could be located.

The most obvious point of contrast with *X. zealandica* (McLachlan) is the shape of the male superior appendage; this difference is especially apparent in the caudal view of the lower lobe. Lateral flanges on the penis are absent in *X. zealandica*. In colour pattern, the diffuse black spot below the metathoracic spiracle appears to be absent in all *X. zealandica* examined, and *X. tuanuii* is markedly more hairy than *X. zealandica*. In the female the pair of large triangles at the dorso-anterior edge of the synthorax of *X. tuanuii* is a distinguishing character. The high frequency of the female androchrome morph in *X. tuanuii* (8 of 14 in the sample collected) contrasts with *X. zealandica* where this morph makes up approximately 20% of the population.

The name *tuanuii* is proposed for this species in honour of Mr Manuel Tuanui of Chatham Island.

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REFERENCES

HUDSON, G.V.

1904 *New Zealand Neuroptera*. West, Newman, London. 102p., 11 pl.

HUTTON, F.W.

1898 On a collection of insects from the Chatham Islands with descriptions of three new species. *Trans . Proc. N.Z. Inst.* 30: 155-160.

McLACHLAN, R.

1873 A catalogue of the neuropterous insects of New Zealand, with notes and descriptions of new forms. *Ann. Mag. Nat. Hist.* (4)12: 30-42.

TILLYARD, R.J.

1913 On some new and rare Australian Agrionidae. *Proc. Linn. Soc. N.S.W.* 37: 403-479.

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